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PLUS

Schrage on Why IT Is Strategic
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Page 30

How IT Could Save $44 Billion in Annual U.S. Health-Care Costs
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"What, Me Stressed?"

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Here's How to Recognize the Signs of Stress, And What to Do About Them Page 40

BY CHRISTOPHER KOCH

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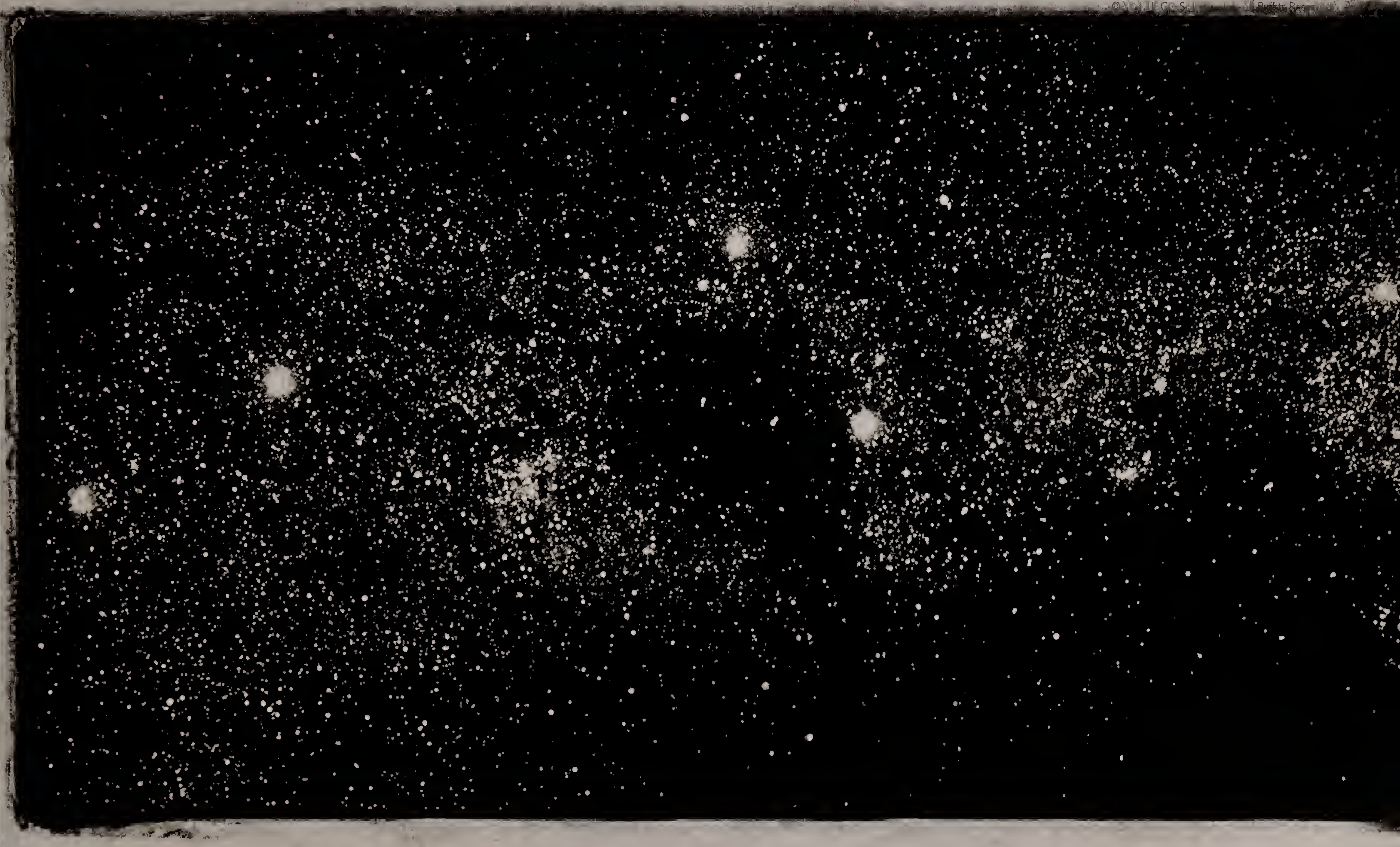

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PERSONAL MANAGEMENT | 40

Stress

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Are you putting on a little weight? Do you think no one understands you? Do you feel out of control? Of course you do. Why should you be different from any other CIO? Here's why you need to stop, take a look around and change your ways. BY CHRISTOPHER KOCH

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CIO

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"Somebody once said that technology is 'anything that doesn't work very well yet,' and by that definition we're employing lots of technology."

–Tom Davenport, New Work Order columnist Page **34**

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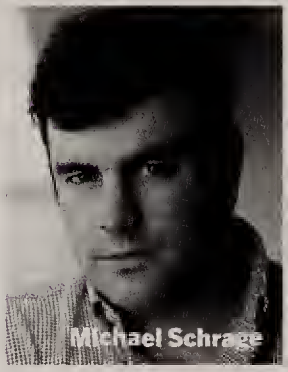
ASK THE SOURCE

Where Are You on the Stress Meter?

Connie Tyne

According to Connie Tyne, executive director of the Cooper Wellness Program, 52 percent of executives will die of diseases related to stress (see **Stress**, Page 40). Don't you be one of them. Through Aug. 15, Tyne will be available to answer your questions about your staff's or your own run-ins with stress. Go to *www.cio.com/ask*.


Michael Schrage

ADD A COMMENT

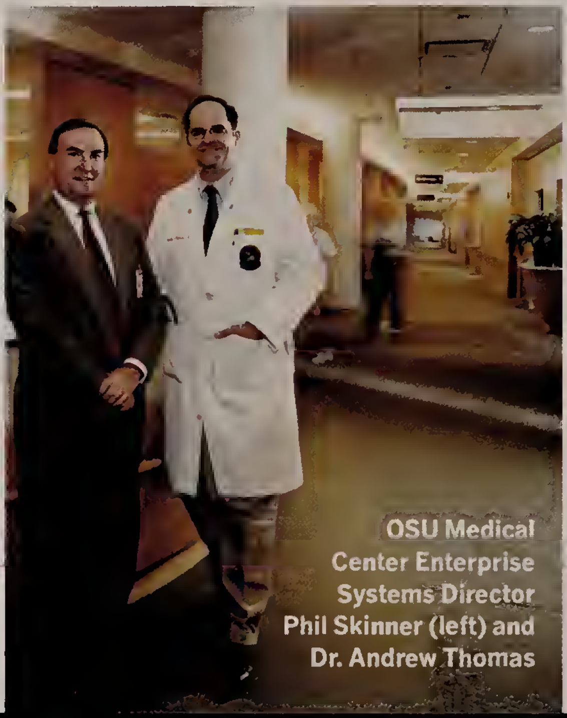
So, *Does* IT Matter?

Has IT lost its strategic importance because it's become ubiquitous? Or do IT's business benefits unambiguously outweigh its costs? Read where columnist Michael Schrage stands on Nicholas Carr's infamous *Harvard Business Review* article (see **Why IT Really Does Matter**, Page 30), then give us your own two cents. Go to the online version of the column to ADD A COMMENT.

LEARN MORE

Background on Health Care + Technology

This issue's health-care package includes **Saving Money, Saving Lives** (Page 52), which looks at the prescription for electronic record-keeping in hospitals. Related stories include "All Systems Down" (from the Feb. 15, 2003, issue of *CIO*), a blow-by-blow record of one of the worst health-care IT crises in history, and "Immune Systems" (June 1, 2003), about efforts to enable a sophisticated IT network against bioterrorism.


OSU Medical Center Enterprise Systems Director Phil Skinner (left) and Dr. Andrew Thomas

Our Daily Web

MONDAY Tech Tact
Technology Editor Christopher Lindquist covers what's coming.

TUESDAY Quick Poll
Vote with your mouse, and see how other IT leaders feel about current events.

SURMACZ

WEDNESDAY Metrics
Web Writer Jon Surmacz makes sense of the numbers.

THURSDAY Sound Off
Web Editorial Director Art Jahnke opines on managerial, political and ethical dilemmas.

FRIDAY The Big Picture
Charts and graphs that are worth a thousand words.

EVERY WEEKDAY The News
We synthesize the top IT news stories of the day.

What's New on the Web

Our Research Centers have now grown to 25 with the addition of the latest on **Budgeting** (*www.cio.com/budgeting*). And all our centers, from **CRM** (*www.cio.com/crm*) to **Leadership and Management** (*www.cio.com/leader*) to **Wireless** (*www.cio.com/wireless*), have undergone a face-lift in navigation. Now it's easier than ever to keep up on the latest thinking in **E-business** (*www.cio.com/ec*) or **IT value** (*www.cio.com/itvalue*) or **Outsourcing** (*www.cio.com/outsourcing*). Check them out.

Find links to the stories mentioned on this page at www.cio.com/daily.

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Edited by Lafe Low and Michael Goldberg

ART DATABASES

IT Aids Search for Looted Art

American troops guard the Iraq National Museum in Baghdad on June 12 (above left). The museum is missing many pieces from its collection including the "Warka Head," a sculpture dating to 3100 B.C.

IRAQ'S NATIONAL MUSEUM in Baghdad was state-of-the-art when it opened in 1967. Scholars of Mesopotamia, such as John Russell, considered the facility well-run. Despite the first Gulf War and United Nations sanctions, the museum had passable lab equipment and a partially computerized records system. That was before the looting this spring.

When Russell, an archaeologist at the Massachusetts College of Art, returned to the Baghdad museum in late May as part of a U.N. fact-finding mission, he saw the challenges in assessing the damage. "The computers and cameras were stolen. The offices were cleaned out," he says. Museum staff and students were "working on the floor, doing a manual inventory" of the remaining collection with pen and paper.

The looting of Iraq's museums and archaeological sites has raised the profile of stolen art trafficking. The worldwide market for stolen art runs as high as $7 billion a year, including $5 billion in antiquities, according to international agencies.

Digital tools are playing an increasing role in combating the trade, but they are no silver bullet. Databases of stolen art and antiquities are relatively small, and there's no unified view. It takes time, money and logistical support to set up a technical response to plunder

Continued on Page 18

BIOMETRICS

Thumbs Down for Lunch

THE OLD "I lost my lunch card" excuse won't work for students in Akron, Ohio, this fall. The Akron school board voted in May to install biometric scanners so middle school and high school students at 18 locations will soon have their fingerprints checked along with their IDs in order to be served lunch in the cafeteria.

School officials said the benefits of the $700,000 system outweighed parents' concerns about the privacy of their kids' fingerprints, *The Akron Beacon Journal* reported. The fingerprint scanners will automate an old system of checking cards and taking meal tickets and cash. (About 58 percent of Akron's children qualify for government subsidized meals.) Funds earmarked for nutritional programs will pay for the project.

Using the fingerprint scanners isn't mandatory. Students can still pay cash for meals. While school officials pledged to maintain the privacy of students' fingerprint algorithms, the Akron school system's website notes the lunch-line system is flexible. "This technology can also be used for other purposes," it states. "For example, it could be used to improve security, attendance reports and transportation programs." *–Michael Goldberg*

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Looted Art

Continued from Page 16

on the scale carried out in Iraq. Nonetheless, IT figures prominently in efforts to size up and address the damage to the country's cultural heritage—which includes its development of agriculture and the written word. Topping the list: U.N. Educational, Scientific and Cultural Organization (Unesco) and Interpol, the international police organization, are collaborating on image databases that will archive the losses, starting with the Iraq National Museum in Baghdad.

The "Warka Vase," a centerpiece of the Iraqi museum's collection, was recovered on June 12. Above, photos of the vase before (left) and the vase, now damaged, after its recovery.

"Stolen items move on the market to potential buyers via images on the Internet," says Russell. "The same techniques might [make] images of questionable pieces available to specialists who might be able to identify them as [either] stolen or legitimate."

Entries in the Unesco database will be transferred via Web forms into Interpol's main image database of stolen art and antiquities. Universities and museums are also compiling image banks and lists of stolen items.

Interpol's database of stolen art has about 20,000 images. Existing databases include national records, such as the FBI's National Stolen Art File, and commercial databases, such as the Art Loss Register and the Trace Stolen Alert Network, which serve private collectors, museums, auction houses and law enforcement.

Lyons, France-based Interpol is putting much of its modest $7.5 million annual IT budget into upgrading its X.400 network to an IP virtual private network linking its 181 member states, says Peter Nevitt, the director of information systems. Interpol is also replacing its text-based e-mail search interface with an image-matching system. "A lot of police lack the language to describe a genuine work of art," Nevitt explains.

Although image databases and VPNs give investigators—and auction houses, dealers and museums—more information, items still must be reported stolen, ownership established, cross-border cooperation authorized and investigations carried out. Digital photography helps in identifying objects, but expert confirmation is typically required, and such extra-agency coordination takes time.

Documented items from museum and private collections are easier to recover, experts say, and the IT tools can help. Undocumented items like those looted from archaeological sites (and most antiquities), are harder to recoup under U.S. and international law because ownership can be hard to establish without a legitimate paper trail.

Interpol aims to create what Nevitt terms a "Yahoo of the law enforcement world," linking individual national crime databases to Interpol's, and providing investigators with a specialized, secure meta search service analogous to Web search engines.

Will the database effort amount to anything? It's impossible to predict, but recent investigations aided by the London-based Art Loss Register have led to the recovery of works by Cezanne (*Pewter Pitcher and Fruit*) in 1999 and Keith Haring (*Little Bad Wolf*) in 2001. *–Ted Smalley Bowen*

E-LEARNING

The World's Largest Classroom

IT WASN'T EXACTLY smooth sailing when the IT department at the Naval Education and Training Command (NETC) in Pensacola, Fla., set out to develop its e-learning system, now the nation's largest. More than two years ago, NETC CIO Curt Jones began working on a distance learning system to serve 1.2 million people—active duty sailors and marines, plus reservists, retirees, civilian employees and family members.

The first order of business was to determine what the Navy could feasibly offer online. Web-based IT classes (of which NETC offers more than 950) were no-brainers. Skills training such as financial management, leadership and military-centric courses were trickier. The challenge was creating the right blend of online offerings, Jones says. "We had to look at things and say, We don't need to do all of our training in brick-and-mortar schoolhouses, and we don't need to do it all on the Web." In many cases, NETC used online classes as prerequisites for classroom training.

The Navy's strict security firewall requirements, which are at odds with the very concept of distance learning, also posed a challenge. "That conflicts with this kind of curriculum where you want to use streaming video and animation that could become a risk to the rest of the community using the network," Jones says. His solution was to build a "shadow" dotcom site—a duplicate of the .mil site that mirrors the content and also doubled the cost of the multimillion dollar project.

Since its debut in May 2001, the Navy e-learning site is averaging 7,500 new users each month. More than 100,000 have registered for the 1,400 courses, which are free to eligible users.

The next step is to connect the e-learning system to a content management system (CMS) to help sailors throughout their careers. The Navy is essentially creating multitasking sailors—a project that will help cut required staff levels on Naval vessels. "The goals are to train the individual and train them in several skills, instead of pipelining them into one skill and saying, You're going to be a mess cook all your life," Jones explains. "This CMS will help them and Navy career counselors figure out what are the skills you need to get the job you want." *–Stephanie Overby*

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By the Numbers

By Lorraine Cosgrove Ware

CRM: Desperately Seeking Success

CRM INITIATIVES at many companies have failed. Yet according to a recent CIO Magazine Tech Poll, 35 percent of executives surveyed in May said their organizations will launch CRM initiatives this year. Likewise, a recent IDC forecast expects the U.S. market for CRM services to grow at a combined annual growth rate of 6.7 percent from 2002 to 2007, reaching $12.1 billion in annual revenue by 2007.

But the success rate of CRM initiatives is low. An AMR Research study shows that, to date, only 16 percent of CRM initiatives have returned value. The balance has been unable to show returns or failed outright, due in large part to companies' inability to define success and goals for their CRM projects. "Companies must define their CRM strategy up front, and that strategy will define what success looks like and which metrics are important," says Kevin Scott, a senior research analyst with AMR Research.

For those bold enough to move forward with CRM initiatives, analysts suggest that companies must embrace change at the enterprise level, and have clear benchmarks and goals at the start, and that collaboration from different parts of the organization—sales, marketing and IT—is a must.

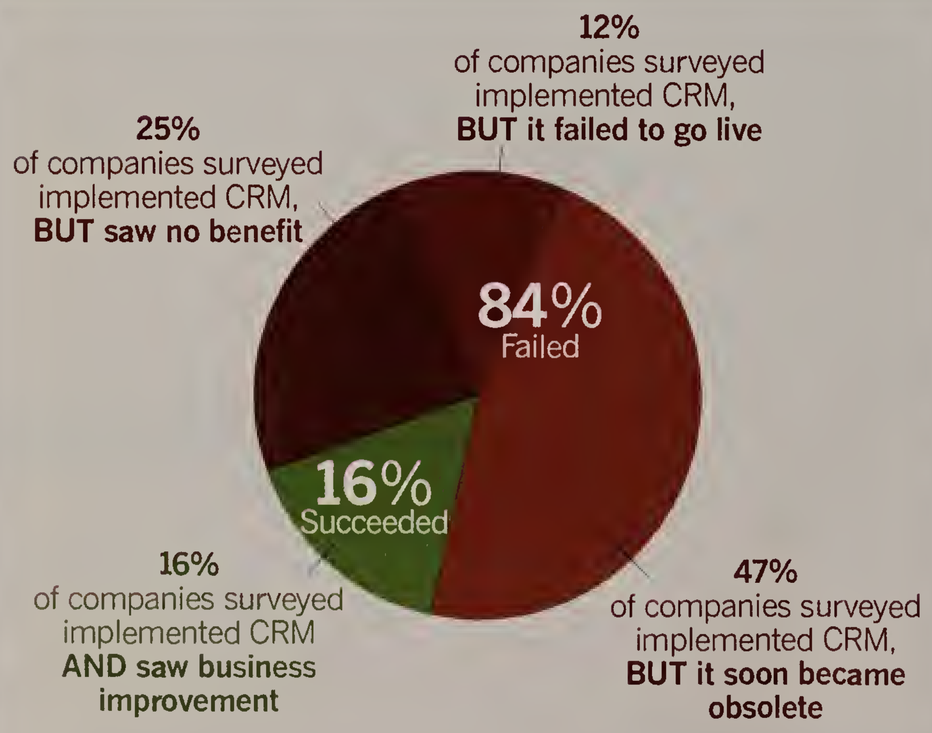
Best Practices: If You're Going to Implement CRM, Do It Right

Be prepared for organizational change. CRM requires collaboration across the enterprise. Forrester Research principal analyst Bruce Temkin recommends that companies employ synchronized deployment—a practice that links technology with strategy, people and process.

Keep it simple. Your CRM application will be accessed by many users with varying levels of technical experience. Make sure your application provides an easy-to-use interface. Additionally, select a vendor that will work with you post-implementation to provide training to get users on board.

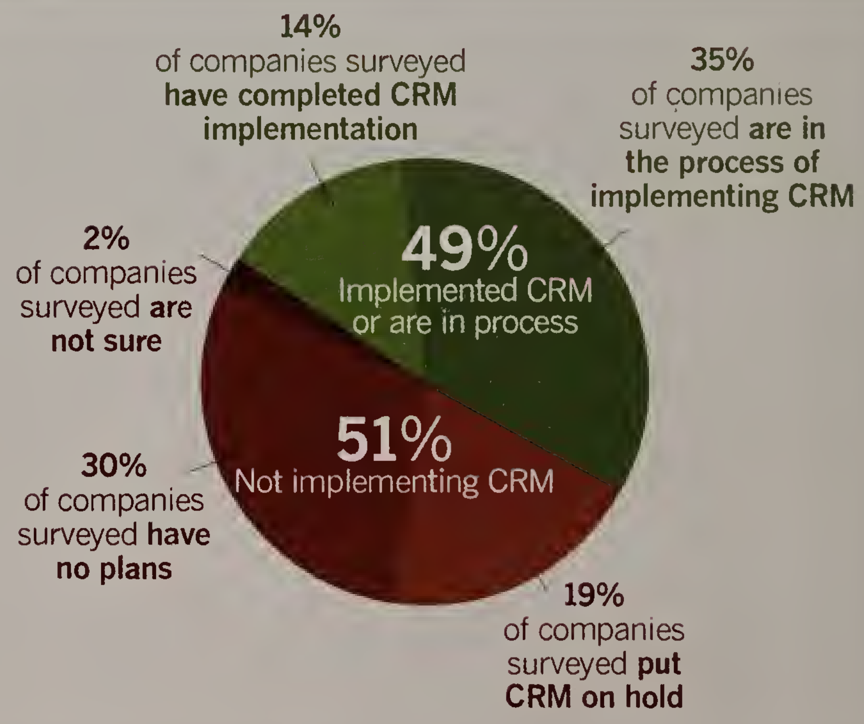
Align your vendor's definition of success with your own. AMR Research reports that CRM vendors define success in terms of the system implementation, while CIOs base success on business benefits. Make sure your vendor understands *your* definition of success.

Most CRM Initiatives Fail...



SOURCE: AMR RESEARCH STUDY "CRM: INFLICTING PAIN OR PROFIT," DECEMBER 2002

...But CRM Goes On



SOURCE: CIO MAGAZINE TECH POLL, MAY 2003. BASED ON 268 RESPONSES (SEE FULL RESULTS AT *WWW2.CIO.COM/TECHPOLL*)

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The 10 WORST Mistakes a CIO Can Make
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ARE WE SAFE FROM BIOTERROR?
BUDGET CRISIS IN THE STATES
BANGALORE
NEW YORK
INSIDE OUTSOURCING IN INDIA
Offshore Veterans on What Works and What Doesn't
STRATEGIES, TIPS, COSTS & PAYBACKS

OUTSOURCING TO INDIA

Offshore Debate Rages

CIOs PRESSED TO CUT COSTS find that outsourcing to India makes economic sense. But those decisions have effects that spread far from the executive conference rooms. Online readers, ranging from jobless IT workers to Indian consultants, posted scores of comments reacting to our June 1 story "Inside Outsourcing in India." Three examples follow (to see more, go to *www.cio.com/printlinks*).

During the '90s I enjoyed working with a few Indian engineers. That is when we all had employment. Well, it is indeed unfortunate that it has come to this because of the greed and corruption we have in corporate America. I have a family to feed in America where the cost of living is significantly more than in India, and every time I hear the mantra 'We'll all win via outsourcing,' I'm more than skeptical. The two winners are technologists in India and upper management in the U.S. The losers will be me and the rest of the middle class of America.

–YALOSE (Yet another laid-off software engineer)

I am an Indian software professional educated in India and the United States. Indian professionals will succeed not just because they are cheaper but also because they are the best (on average). [As] a CIO, would you give work to an Indian with an Ivy League education working in India at $10,000 per year? Or to an American night schooler who demands $70,000 per year? According to America, this is supposed to be a free world. Does this mean free only for the West? Don't keep us beggars forever.

–Ram, Consultant, J2MEWorks, Chennai, India

Our economy is slowly beginning to create jobs again. The problem is that the jobs are mostly overseas. Our largest, most profitable companies are shipping our jobs and middle class income to third world countries where they can get two or three workers for the price of one. Economists say this is creating the largest 'jobless recovery' in U.S. history.

What good is a tax cut and lower interest rates going to do the United States when all of our highest paying jobs are moving out of the country? These high paying jobs are America's tax base.

–Corey Goode, www.goodetech.com

Otis's David Wood says CIOs need a point person to manage outsourcing relationships.

Offshore Governance Dos and Don'ts

DAVID WOOD, director of systems development for Otis Elevator, knows about outsourcing to India—he's got a decade of experience under his belt (see "Inside Outsourcing in India" at *www.cio.com/archive/060103*). Below is Wood's list of dos and don'ts for CIOs who want to set up a governance model for monitoring offshore vendors. See more of Wood's comments in an online forum with *CIO*'s readers at *www.cio.com/ask*.

Governance is a critical success factor for offshore engagements.

Do:

Make sure that there is an **executive sponsor** for outsourcing, usually the CIO.

Assign responsibility for managing the outsourcing activity, the primary interface between the vendors and your company.

Form a **steering committee** made up of the CIO and key business executives—and meet regularly. Review vendor metrics, progress and strategic directions.

Make sure that **project governance** is also in place—typically managed by an IT lead and a business lead—for each project.

Don't:

Assume the vendor can replace all members of your staff.

Assume that a vendor does not require **both long-term and day-to-day management** and direction.

Assume that vendors will always make decisions with **your best interests** at heart.

Assume that the vendor needs to be managed in an adversarial way. The vendor becomes **an extension of your team**. Govern it wisely and in many ways the way you would govern your own employees.

PHOTO LEFT BY TRACY KROLL

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On the Move

By Meridith Levinson

Beltway Turnover

THE WAR ON TERRORISM is being fought on many fronts—not the least of which are in the ranks of federal government CIOs. In July, *CIO* reported that the FBI's newest and most unlikely recruit, **Darwin John** (left), retired from the bureau after less than one year on the job (to read more about John, see "The Unlikeliest G-Man" at *www.cio.com/printlinks*). No word on a replacement at this time.

Darwin John

The Army is transforming its IT leadership. It has eliminated the CIO post from the Army Reserve, according to a report in *Federal Computer Week*. The government IT weekly quoted Army Maj. Gen. John Scott as saying the purpose of eliminating the Reserve's CIO position is to make acquiring and implementing IT more efficient. The Army's CIO, **Maj. Gen. Steven Bouttelle**, will take command of IT for the Reserve from the current CIO, **Daniel Wiener II.**

Wiener would do well to follow the precedent set by other government CIOs who have joined the lucrative consulting industry. **Ron Turner**, who retired as CIO of the Navy in 2002, joined the consultancy Booz, Allen & Hamilton last May. Also that month, **John Thomas Flynn**, the one-time CIO for the states of California and Massachusetts, joined ICG Government, a government technology consultancy.

In other Beltway news, IRS Commissioner Mark W. Everson last May tapped the agency's current CFO, **W. Todd Grams**, to lead IT. Grams' appointment as CIO comes amid a major reorganization within the commissioner's office. Grams will oversee the agency's efforts to modernize information technology, including replacing its decades-old Master File system.

Last, but not least, the Department of Homeland Security placed Deputy CIO **Laura Callahan** on paid administrative leave last June when questions about her academic credentials surfaced during a Congressional background check. Congressmen are concerned about the validity of her PhD in computer information systems from the unaccredited Hamilton University in Evanston, Wyo. Callahan went to Homeland Security from the Department of Labor last April.

Movin' On Up

There's nothing like key retirements within a company to open growth opportunities. At Delphi, **Peter Janak**'s (left) retirement as CIO on July 1, 2003, made room for **Bette Walker** to move up at the automotive parts supplier. She was promoted from executive director of business operations to vice president and CIO, and now reports to Alan S. Dawes, vice chairman and CFO.

Peter Janak

Raymond Smith's retirement as CIO of Delphi unit Delphi Harrison Thermal Systems paved the way for **Lynn Bragg**'s promotion. Bragg was promoted to CIO from director of development for Delphi's Vega Program. He reports to Delphi Thermal President Ronald M. Pirtle and to new Delphi CIO Walker.

At Assurant Group, **Robert Lewis** is now executive vice president and CIO of the risk management product underwriter. Lewis was promoted when his boss, former Assurant CIO **John B. Owen**, was named COO of the company.

When **Albert Aiello** retired from his post as global CIO of The Lend Lease Corp., **Jay Skibinski** moved in after just seven months on the job. Prior to his promotion, Skibinski was the CIO for the Americas region.

Of course, retirements aren't the only reason for promotions. Solid performance is still one way to get ahead. **Jennifer Bolt** was promoted to senior vice president and CIO of Franklin Templeton Investments in May. She previously served as managing director of Franklin Templeton Technologies and as the company's chief Web officer. **Jess Reed** has climbed his way from performance analyst to project analyst to planning analyst to director of telecommunications to assistant vice president to vice president of information services and systems operations to where he sits today after nearly 30 years of service—the office of group vice president and CIO of Geico.

Finally, Lucent Technologies, which has suffered financial losses amid its restructuring attempts, shared some good news about its CIO with investors last June. **Ruth Bruch** (right), Lucent's senior vice president and chief information officer, was appointed to the board of directors for Mellon Financial. This appointment recognizes the contribution she's made to the ailing technology company since she joined it in April 2002.

Ruth Bruch

"Our commitment to recognizing technology as a business line-driven activity begins at the top with our board of directors," says Martin G. McGuinn, chairman and CEO of the financial services company. "With a strong background in the areas of technology, corporate strategy and executive management, Ruth brings a unique combination of talents that will be a tremendous asset to our board."

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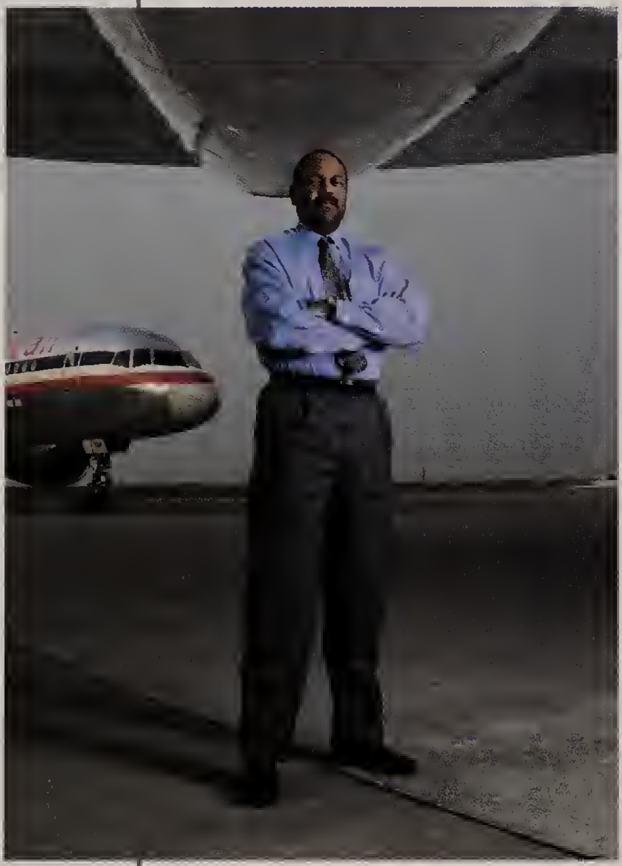
FOLLOW-UP

American's CIO Carries On



Still flying: American Airlines CIO Monte Ford continues to pursue IT goals in a turbulent corporate climate.

PHOTO BY CHET SNEDDEN

A YEAR AGO, American Airlines' executives probably thought things couldn't get much worse. They were reeling from the attacks of Sept. 11 and a lingering economic malaise that was draining the life out of the airline industry.

Fast-forward to 2003. Things *have* gotten worse. American is fighting desperately to stave off bankruptcy, former CEO Don Carty resigned in April, and the major airlines continue to struggle. Amid this unprecedented turbulence, CIO Monte Ford and his staff keep flying. Here's an update on some of the major issues facing Ford since *CIO* profiled the airline last year (see "Can American Keep Flying?" at *www.cio.com/printlinks*).

IT budget: Since CEO Gerard Arpey came on board, the IT budget continues to decline, but spending has been much more targeted, says Ford. And there is greater direction from the business units on where to focus money. "Spending is down, but it's better," he says.

IT and business relations: Collaboration has also improved since Arpey's arrival. Every Tuesday, AA's senior leadership team meets to review projects, generate ideas and set strategy. "[Arpey] expects us to work together as a team," Ford says. "That's a pretty tall order. When you run a company as big as AA, to function as a team and understand what's going on across the various business units is a tremendous task."

Going electronic: Paper transactions at airport check-in counters have been reduced to a minimum. AA has implemented e-ticketing with more domestic carriers than any other airline; it launched online check-in on AA.com last December, and the self-service kiosk rollout continues (there are now more than 700 in 85 airports). Internally, the IT staff continues to enhance the company's portal, Jetnet, which attracts some 30,000 employees a day who check benefits, get company news and book flights. Ford is also rolling out wireless handhelds for flight mechanics, to expedite maintenance and help prevent flight delays.

IT staff morale: Ford says he's proud of how his employees have held up in these turbulent times. When asked how he keeps their morale aloft, he says, "I could give you some pat answer that sounds good, like leadership is key, but it really is a dedicated, talented group of people who are really self-motivated."

–Todd Datz

This Date in IT History Aug

1996 A month that shall live in infamy—sort of. The **war of the browsers** begins—Microsoft marches directly into **Netscape Navigator** territory with the release of **Internet Explorer 3.0** on **Aug. 12**. To win over the browsing public, Microsoft includes free subscriptions to online services such as Hollywood Online and *The Wall Street Journal*. More than 32,000 users download the app within the first six hours. Netscape counterattacks one week later with **Navigator 3.0**, an upgrade of its existing browser that previously held a 75 percent market share. One day after that, it ambushes the Redmond juggernaut by publicly releasing a letter it sent to the Justice Department accusing Microsoft of monopolistic business tactics, including shady incentive offerings to computer manufacturers and ISPs in exchange for their use of **Explorer**. Microsoft denies the claims, but when it goes to court to answer to antitrust allegations in May 1998, Netscape's letter becomes a framework for the prosecution's game plan. The battle of the browsers rages on until March 1999, when America Online acquires Netscape, but Microsoft's increasing dominance proves too fierce for the underdog Netscape, which slowly withers away until it is swallowed whole by AOL.

Other Notable Events

1

Nasdaq's e-trading network goes down for 34 minutes in **1994**, after a squirrel chews through power lines outside a data center in Trumbull, Conn.

2

Father of the telephone **Alexander Graham Bell** dies in **1922**. During his funeral, all telephone traffic in the United States and Canada is silenced for one minute in Bell's honor.

9

Netscape's IPO opens to buyers in **1995** for $28. The price peaked at $75 per share before closing at $58.

16

Compaq agrees to post warning labels on its keyboards in **1994**, following a slew of lawsuits from achy-fingered typists suffering from repetitive stress syndrome.

24

Windows 95 is released in **1995**, and a Harry Potter-esque shopping frenzy ensues. It sells more than 1 million copies in four days.

30

The **first computer to serve as the backbone for the Arpanet** is shipped to the University of California in **1969**. This is the first stake in the ground in what eventually becomes the Internet.

–Daniel J. Horgan

SOURCES: Canada's Digital Collection, History Channel, New Zealand NetGuide, University of Surrey.

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Michael Schrage | Making IT Work

It's All About the Execution

Why IT Really Does Matter

Businesses can indeed differentiate themselves through IT. It's all a question of how they manage the technology.

THE *HARVARD BUSINESS REVIEW* is not famous for publishing satire. Then again, when a clever writer pushes a clever idea well beyond the point of diminishing returns, the result can read like parody from the pages of *The Harvard Lampoon*. You're not quite certain whether you should sagely nod or burst out laughing.

Nicholas Carr's controversial article "IT Doesn't Matter" presents a brilliant example of this rare genre. Ever since its May publication, his thesis has provoked heated debate both in tech circles and the realms of senior management. Much of the debate has been of the "IT does *too* matter!!!" variety, but Carr's seriocomic screed deserves a rigorous dissection because he's clearly struck a nerve as well as a funny bone.

Carr's narrative deserves to be read as an intriguing technical argument in the service of grotesquely naive business assumptions. His facts may be flawless and his historical analysis smooth. But the business conclusions he draws are profoundly silly. CIOs had better understand why, because they may report to intellectually lazy CEOs and CFOs who actually believe that the *Harvard Business Review* is giving its imprimatur to a powerful argument when, in reality, it is cleverly overhyping a clever little idea. Caveat lector!

So let's cut to the heart of Carr's case: "What makes a resource truly strategic—what gives it the capacity to be the basis for a sustained competitive advantage—is not ubiquity but scarcity. You only gain an edge over rivals by having or doing something that they can't have or do. By now, the core functions of IT...have become available to all. Their very power and presence have begun to transform them from potentially strategic resources into commodity factors of production. They are becoming costs of doing business that must be paid by all but provide distinction to none."

Excuse me? Who says that resource scarcity is the key to strategy? Why on earth is resource ubiquity inherently the low road to commodity? That sort of glib analysis gives Econ 101 a bad name. In fact, it's shockingly easy to show there is virtually zero correlation between the availability of a commodity and its effective role as a so-called "strategic" resource.

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Consider this thought experiment: Three companies bitterly compete against each other for market share and profit—for example, FedEx, DHL and UPS; or Nike, Reebok and Adidas; or American Airlines, Southwest Airlines and JetBlue Airways. Give them each $100 million. No strings attached.

So will these companies be equally better off in their rivalry with each other because they each have $100 million to invest? Of course not. Some of the companies will enjoy significantly greater returns on their free $100 million investment than the others. Capital is a commodity, right? Yet somehow we consistently see enormous disparities within industries in their return on capital. We could keep feeding these companies free capital and the disparities would persist. Would *Harvard Business Review* publish "Capital Doesn't Matter"?

Capital is a commodity, right? Would *Harvard Business Review* publish "Capital Doesn't Matter"?

Suppose, instead, we offer these business rivals equal access to the very best and very brightest graduates from Harvard, Berkeley, Stanford and MIT. Should we rightly expect each and every company to get comparable value from this incredibly rich talent pool? Or does reality—and bitter experience—dictate that some companies will manage to get incredible performance from truly mediocre talents while others will blithely waste the time, effort and energy of their most gifted hires? Perhaps *Harvard Business Review* should print "Talent Doesn't Matter."

Now let's give every single employee of every single company his very own *free* Wi-Fi-ed Linux laptop, PDA and cell phone along with all the training and technical support he needs. Free. Does anybody in their right mind believe that this huge endowment in personal technological capacity will equally lift the productivity and profitability of these competitors?

Those three simple thought experiments affirm an undeniable truth: It's not free and easy *access* to a commodity that determines its strategic economic value to the company; it is the *way that commodity is managed* that determines its impact. Management matters. The idea that companies can divorce their resources—no matter how cheap, powerful and ubiquitous—from the act of managing them is patently absurd.

Add a Comment

Has IT lost its strategic importance because it's too ubiquitous? Or do IT's business benefits outweigh its costs? If you **SIDE WITH CARR OR SCHRAGE**, go online and give us your two cents. Find the link to this story page at **www.cio.com/080103**. **CIO.com**

This should come as no surprise to any serious reader of, say, *CIO* magazine or even *Harvard Business Review*. Yet the very premise of "IT Doesn't Matter" is that the quality of management matters far less than the quantity of the commodity. The more persuasive argument is that the quality of IT management matters even more as the IT commodity becomes ubiquitous.

Carr insists at great length that the quality of management doesn't matter because IT is really an "infrastructure" technology like electricity, the steam engine and the internal combustion engine. IT, he argues, ultimately devolves into commoditized ubiquity, like lightbulbs and telephones. Infrastructure technologies—as opposed to proprietary technologies—inherently preclude opportunity for sustainable competitive advantage.

But why should IT be treated more like electricity and automobile engines than such media as telephones and television? Don't companies creatively use call centers and television advertisements to cost-effectively manage customer interaction and build brand equity? Would Carr suggest that Coca-Cola treat television advertisements as commodities? Should Dell treat its call centers as commodities?

In truth, IT is more a suite of techniques than an arsenal of technologies. So why does Carr compare IT to the way power utilities are organized instead of, say, the way factories are organized? Why not IT as the "flexible information factory" instead of the ubiquitous information utility? Computer Numerically Controlled machine tools should be seen as a manufacturing *medium*. Does the commoditization of machine tools mean that "Manufacturing Doesn't Matter"?

Let me offer one plausible hypothesis: Comparing IT to a factory instead of a utility would undermine Carr's thesis. Why? Because the future design of factories *does* matter to the future of business innovation and competitiveness. In other words, Carr clings to the "commodity infrastructure" assertion not because the weight of evidence supports it but because it is a framework that supports his case.

The real issue is whether IT's business benefits unambiguously outweigh its costs. Carr argues, rightly, that too many businesses have spent too much money on IT with too little to show for it. Then again, a lot of companies have lost money using derivatives as a tool to manage currency risk.

What Carr fails to recognize is that IT can profoundly transform the economics of innovation, segmentation and differentiation for most businesses. And in that recognition lies the CIO's ultimate opportunity. I bet Carr knows this. But it's always easier to be provocative than do the hard work of turning commodity technologies into value-added business products. CIO

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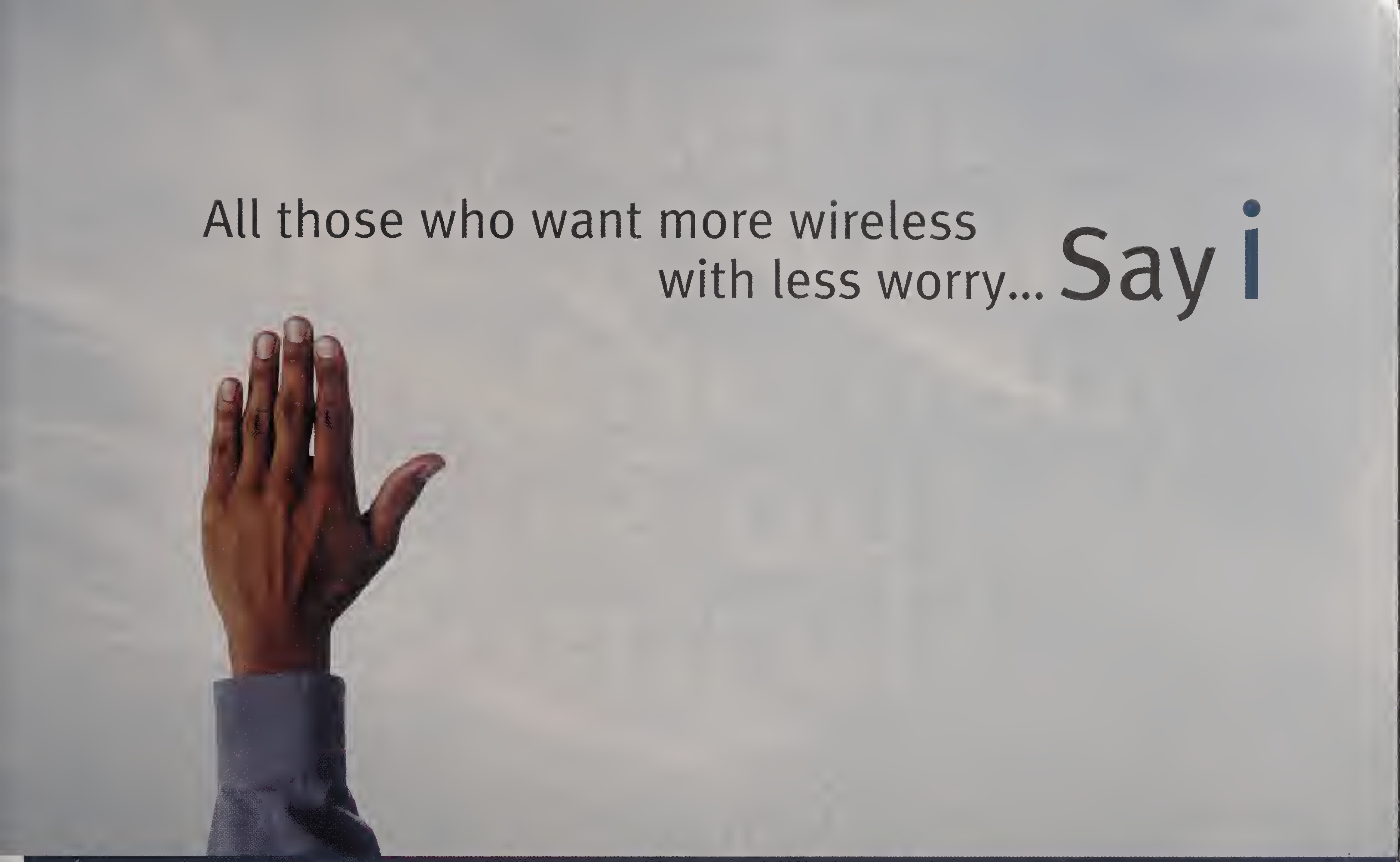
PHOTO BY JOHN SOARES


All those who want more wireless
with less worry... Say i

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Wireless networks offer businesses several advantages. Increased mobility, design flexibility, lower costs. But as with most new technologies, design focuses on functionality – not risk. Wireless technologies do not have the physical access restrictions used in traditional wired environments. They make it possible for someone in the lobby or across the street to have access to a network carrying patient or employee information, sensitive corporate data, or trade secrets.

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Business Risk | Technology Risk | Internal Audit

Tom Davenport | The New Work Order

Retooling the Knowledge Worker

Serenity Now!

If businesses don't find a way to help the knowledge worker manage information technology, today's confusion will lead to tomorrow's insanity

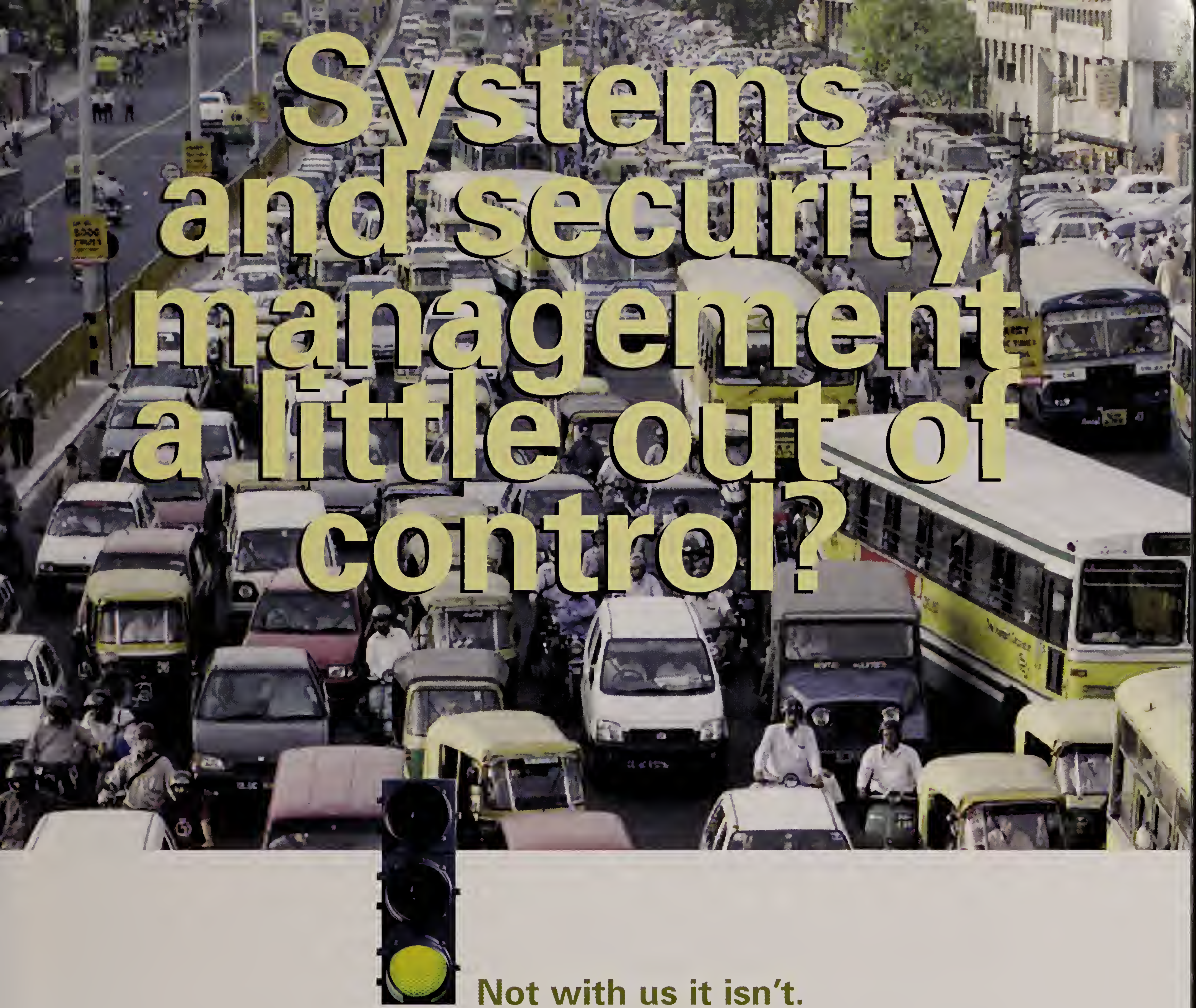
ILLUSTRATION BY CLAUDIA NEWELL

SOLVING THE PROBLEMS of knowledge worker productivity and performance is a daunting prospect, so it makes sense to start with the most simplistic approach to research I know—studying...me. I've been known to develop enormous insights about others just by looking at my own problems and approaches. And, as any good Buddhist will tell you, observing oneself is the path to enlightenment. I'm not a Buddhist, mind you, but that's OK since my aims are more modest than enlightenment: I'm only shooting for a little sanity.

Like everybody else these days, I'm feeling a bit overwhelmed by my own personal information and knowledge environment. I have lots of electronic devices—it seems like a lot to me, anyway. For these purposes, I'm intentionally ignoring the devices my family uses, for which I am the first-line (if somewhat reluctant and ineffective) provider of technical support. For my own use, I have a desktop PC at home, a laptop PC that travels with me, a PDA and a typical cell phone. None of them communicates very well with each other (though my PDA, for example, communicates reasonably well with my wife's and my assistant's PCs), and I occasionally have to send e-mails from one device to another as if they were distant cousins. I know they could be made to communicate better with each other, but I don't have time to figure it out, and frankly I am grateful if they are all just working.

E-mail has become the core of my information flow, but I get too much of it. I have four addresses, which get forwarded into two different e-mail clients. I know that isn't ideal, but if you work with multiple organizations, you tend to have multiple e-mail identities. A couple of those identities I access only at home, which makes my response time to them slow, but it keeps me sane.

Today I got 72 e-mails through one account and 29 through another, for a total of 101. About a third (a much higher fraction on weekends) were from spammers, which I am coming to believe are the lowest form of life on the planet. I sent out 32 messages during the day. I did all this through a broadband



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connection in my hotel—pretty cool—and it only cost me $12.95 and the hour I wasted trying to get connected to it. I finally called the front desk for help, and the attendant told me that it wasn't working but I should keep wasting my time trying to connect because it would probably be working soon.

Then there's my inbox, in which I have 1,716 messages. You may find that scandalous, but it works pretty well for me. I've basically created one big filing cabinet for stuff I might need later. I delete about two-thirds of my messages on any given day, and the other third slowly drift up the screen. Every so often I delete a couple hundred old e-mails. I recently attended a time management class in which the instructor suggested emptying your inbox every day, but I found that ludicrous. Maybe I'm just undisciplined, but I find I have to think about a lot of the e-mails I get—or solicit a response from someone else—before I can answer them.

I've got too many devices. Keeping them in sync takes too much time. Unfortunately, this problem is only going to get worse—for me and for the world at large.

I also get lots of voice mails in my three mailboxes—a total of 22 in today's queue (in part because I didn't get around to checking them yesterday). I don't like voice mail very much, and I try not to listen to my messages on my cell phone while driving anymore because I'm tempted to write things down in order to respond—particularly difficult in the car. I hope voice mail goes away soon or gets merged with e-mail. If you want to make my day, call me and hang up. Being able to delete a blank voice message seems a considerable accomplishment.

I have consciously chosen *not* to add certain tools and technologies to my information environment. I don't do IM, for example. I used it for a while, and I didn't like having my attention held hostage by anyone who felt like sending me a message. I also don't have any interest in wireless e-mail. I can't remember any e-mail that was so important that I needed to read it in a taxi. And I don't blog or read others' blogs—although one might wonder exactly how this rambling column differs from a blog other than being in print.

Once, at a time management course, the instructor advised making my PDA the center of my digital life. I tried for a day to use it for "to-do" lists and so on, but I couldn't get used to it. Instead, I would write phone messages on any paper I could find, but not surprisingly, I lost a lot of them. So now I restrict myself to one notebook at a time. The only problem with that is that I consider it too important to waste on to-do lists and phone numbers, so I still write those on scraps and promptly lose them.

The Roots of My Informational Problems

At best I consider myself only fair at managing my personal information and knowledge environment. Where do I go astray? I think about that a lot, and I have a few hypotheses.

First, I've got too many devices. Keeping them in sync would simply take too much time. Unfortunately, this problem is only going to get worse—for me and for the world at large. I was at a conference recently where all these technologists kept telling me that intelligent machines already outnumber humans 10-to-1, and they are growing at a much faster rate than we will. Of course, the technologists are saying that these devices will all be seamlessly linked, but I know better.

My second problem is that I don't seem to get much help from my organizations. There is some assistance available for the use of each particular tool (except for PDAs, home computers and networks), but the support is fragmented. I don't really blame them because no organization seems to do this well, and I'm not sure anyone really knows the key to personal information effectiveness. I do believe that a substantial amount of business advantage in the future will come from making workers more effective and productive in the use of all this stuff, so more resources ought to be injected into assisting us poor sods.

I've already suggested that technology doesn't work well enough. Too many things break; too much software has bugs; too many features don't function. Somebody once said that technology is "anything that doesn't work very well yet," and by that definition we're employing lots of technology.

After blaming everyone else, let me also blame myself. I, like most people, underinvest in my own information environment. For some reason I have a neurotic fear of spending too much time on personal organization. I'd much rather write an article or book chapter or even an e-mail than write down an address or an appointment. On an airplane, I'd read 10 books or newspapers before cleaning up my to-do list. At least I know my preferences—and I'm willing to live with the negative repercussions.

So there you have it—a sad tale of a knowledge worker's informational peccadilloes. To all you vendors out there, I'd pay a lot of money to anybody who could change my life without too much personal sacrifice. And to all you employers of people like me, throw us a lifeline—as soon as you can figure out what it is! CIO

Tom Davenport is director of the Accenture Institute for Strategic Change and professor of IT and management at Babson College. You can reach him at *tdavenport@babson.edu*.

Profitability thresholds and the feasibility of toast.

Can you see it?

Kris Pederson, practice leader, communications industry

You push a button, you get toast. Easy. But only because you don't have to build the hydroelectric dam that furnishes the few watts it takes to make toast.

Now imagine that you are a telecom company, for example, looking hard at a lot of brilliant service offerings that defy feasibility because revenues just won't beat costs unless you sign up millions of customers. Which isn't likely. This is where on demand business comes in. Where the infeasible can become profitable because new thinking trumps old.

You look again at your fixed costs — everything from models to processes to infrastructure. Could they be outsourced? Are there any bits of your cost structure that aren't core competencies? If so, whose core competencies are they? No stone is left unturned.

Soon, you're out of the hydroelectric dam business, focused on telecom offerings, and making toast like there's no tomorrow.

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Stress

Are you putting on a little weight?
Do you think no one understands you?
Do you feel out of control?
Of course you do.
Why should you be different from any other CIO?
Here's why you need to stop,
take a look around and change your ways.

BY CHRISTOPHER KOCH

FOR SEVEN YEARS, Joe Gagliardi, a programming manager for Southeast Frozen Foods, worked in what felt like a sick ward.

Everybody was constantly ill, though Gagliardi fared better than most. "There were always colds, sneezing, temperatures and a lot of sick days," he says.

The programmers worked in a separate building (no, not a freezer) so some became convinced that it must be the building making them sick. What else would explain it?

A programmer called the Centers for Disease Control and Prevention, and eventually the company hired some environmental consultants to investigate.

The consultants came. They sampled the air and the water, looking for poisons and pollutants. They sniffed the rugs and peered into the air-conditioning ducts, looking for viruses and bugs.

They didn't find anything.

Five and a half years ago, Gagliardi left that job to become CIO of Unisa, a distributor of women's shoes and accessories.

And he got better.

So maybe the consultants had missed something.

Or maybe all the coughing and sneezing and fevers had something to do with the fact that Gagliardi and his fellow programmers regularly worked long weeks and 12-hour days. Most of Gagliardi's colleagues eventually quit, until it was just him and a woman who started the same time he did.

As he's talking about this, Gagliardi has an epiphany. "My God," he says. "I realize now that that's why we were sick all the time.

"It was the stress."

Reader ROI

- The science behind stress
- Why the CIO job is singularly stressful
- Strategies for coping with executive stress

PHOTO BY FURNALD/GRAY

The Stress Epidemic

Only in the past 20 years or so has science arrived at the same conclusion as Gagliardi. The *New England Journal of Medicine* in 1998 went so far as to declare that "managing the long-term effects of the physiological responses to stress is critical to survival." Stress may contribute to 85 percent of all medical problems, says Connie Tyne, executive director of the Cooper Wellness Program in Dallas, which counsels executives on stress reduction. Fifty-two percent of executives will die of diseases related to stress, according to Tyne. That's partly because stress affects nearly every major system in our bodies, creating a laundry list of health problems—among them diabetes, high blood pressure, stroke, allergies, asthma and colitis.

> CIOs have a vast amount of responsibility but little authority for controlling outcomes. This is what psychologists call low decision latitude. And according to a 1997 study, executives with low decision latitude saw their risk of illness increase anywhere from 30 to 1,700 percent.

The clearest sign that there's a stress epidemic can be seen in heart disease statistics. For example, a recent study found that people who get less than five hours of sleep twice a week or more are 300 percent more susceptible to heart attacks. Their overall rate of developing heart disease doubles.

Not surprising, stress has been on the rise in the past few years. With the economy gone bad, unemployment rising and the threat of terrorism, most Americans report feeling more stress today. It's even worse for executives.

Constant stress does more than damage your health. It destroys your judgement and distorts your decision-making process. Constant stress has been shown to shrink the hippocampus, a region of the brain that controls memory and concentration. "We all know anecdotally that when someone is under stress they don't have the clearest vision," says Tyne. "They don't have the patience to work through a complicated decision. They will have a tendency to abdicate or jump into a decision prematurely."

CIOs don't like to talk about how stress affects them. They are taught that stress is to be accepted, swallowed whole and its effects ignored. Admitting to, or worse, displaying stress is a sign of weakness, an admission of failure. Unfortunately for CIOs, this belief is widely shared, at least at work.

"You have to carry off the position with dignity and a show of strength in public," says Jim Quick, professor of organizational behavior at the University of Texas at Arlington. "You have to reflect the strength and power of the organization even if as an individual you're feeling somewhat vulnerable."

This means that CIOs need to deal with stress on their own—a lonely and difficult struggle that few executives choose to face. Denial is easier. But denial inevitably extracts its toll in health, relationships with family and friends, careers, and even lives.

FOR CIOS IN DENIAL

12 Warning Signs That You're Stressed Out

1. Your stomach hurts; your head aches; you catch colds frequently.
2. You feel emotionally numb.
3. You snap at people: colleagues, your spouse, your kids.
4. People tell you they're worried about you.
5. You feel that if you take on one more task, you're going to blow.
6. You feel like quitting your job. Often.
7. You feel helpless, out of control.
8. You know that whatever you do, things are bound to go wrong.
9. And you know that when they do, you'll be the only one who cares.
10. You feel guilty about taking a vacation.
11. You know the problem: it's everybody else.
12. You can't stop thinking about your work. Ever.

SOURCE: SCOTT STACY, CLINICAL PROGRAM DIRECTOR, PROFESSIONAL RENEWAL CENTER

The Science of Stress

The reason that stress, and our response to it, has so much power over us has to do with evolution, which as far as stress reaction goes, stopped 30,000 years ago when modern man replaced the Neanderthal. Our earliest human ancestor, Cro-Magnon man, needed to control his environment in specific ways to avoid starving or being eaten by predators. To survive, he needed help holding off the saber-toothed tigers or bringing down a mammoth for dinner—so evolution favored those who felt uncomfortable alone and sought out the company of others. Knowing the guy in the next cave increased his survival chances, as did his drive to control his environment by, say, developing a mental map of the hunting grounds nearby, or stacking a pile of clubs and rocks near the cave's entrance for protection. He learned to hate uncertainty because in his world, surprises were usually lethal.

Today, we hate uncertainty every bit as much as our ancestors did. Read the headlines about Sept. 11, the postwar in Iraq, kidnapped children or even that memo from the CEO canceling the ERP project, and you'll experience the same reactions that our caveman had when he noticed that the tigers had moved from their usual lair: sweaty palms, an elevated heart rate. No doubt the caveman's worries and stress were nearly constant, but he rarely lived long enough to develop stress-related pathologies such as heart disease.

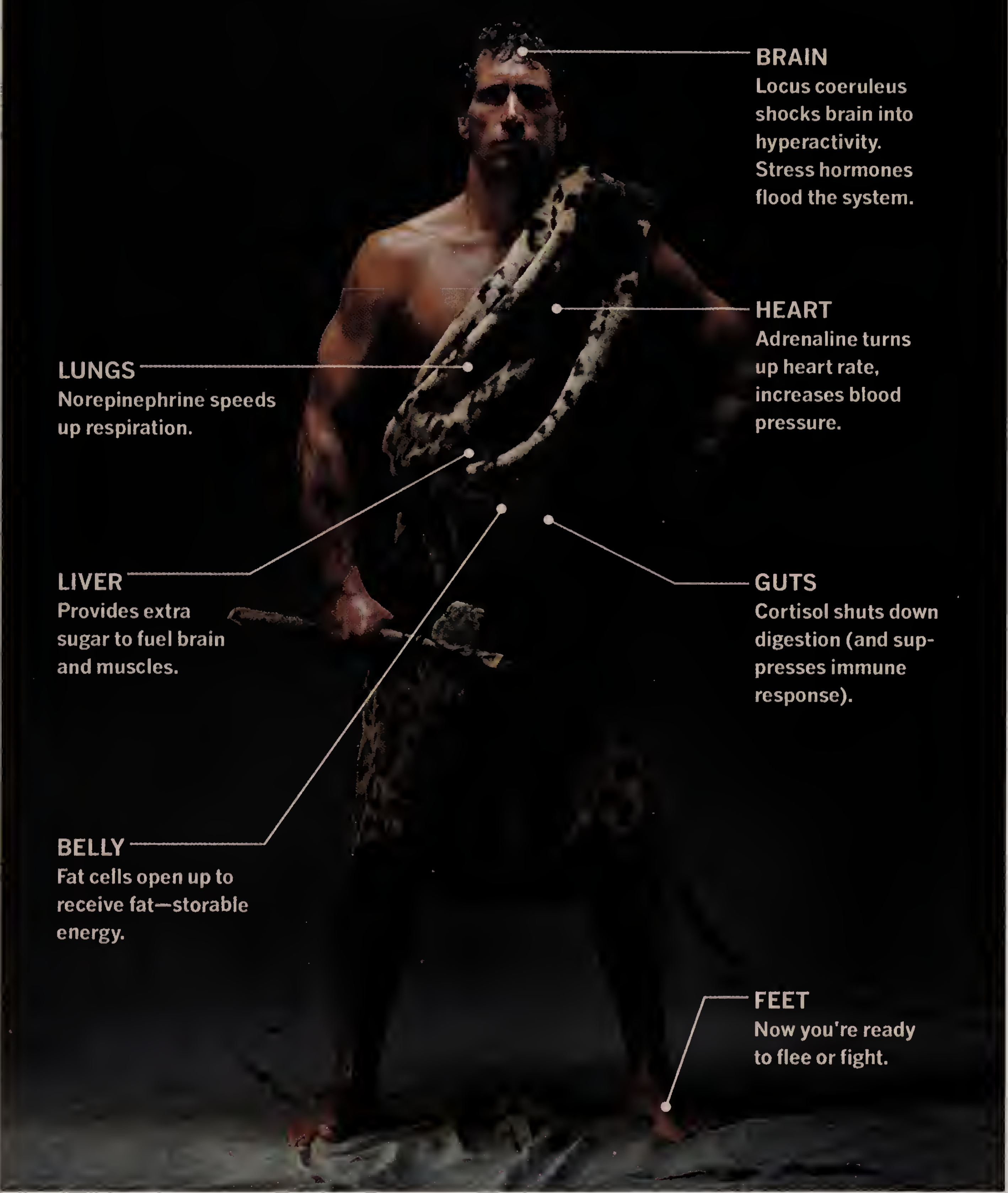
We do. And science is now linking the daily anxieties and worries that cavemen felt to a much more powerful, primitive reaction to stress, the "fight-or-flight response," as researcher Walter Cannon dubbed it in the early 1900s. This is the biological process designed to help cavemen out of serious jams such as a saber-tooth suddenly showing up at the door of the cave. The process is extremely effective for its intended purpose: fighting the tiger or running away.

First, the sight of the tiger signals the brain's speed regulator, the locus coeruleus, to shock the rest of the brain into a state of hyperactivity and alertness. The brain then causes a chemical called norepinephrine to be released into the autonomic, or involuntary, nervous system—turning up the dial on blood pressure and respiration.

Simultaneously, cortisol, known as the "stress hormone," shoots through the bloodstream to vital systems, turning off those that don't play an immediate role in survival—such as digestion and the immune system—while supercharging others—such as the liver—to provide extra sugar to fuel the brain and muscles. Meanwhile, adrenaline turns up the heart rate and blood flow. It's like gunning the accelerator at a stoplight. The body is revving itself up for what, in the caveman days, was very likely to follow: a life-or-death struggle or a frantic escape.

The 30,000-Year-Old Stress Response and How It Works

When you see a tiger (or your CEO) on the prowl...



BRAIN
Locus coeruleus shocks brain into hyperactivity. Stress hormones flood the system.

HEART
Adrenaline turns up heart rate, increases blood pressure.

LUNGS
Norepinephrine speeds up respiration.

LIVER
Provides extra sugar to fuel brain and muscles.

GUTS
Cortisol shuts down digestion (and suppresses immune response).

BELLY
Fat cells open up to receive fat—storable energy.

FEET
Now you're ready to flee or fight.

The Wages of Stress

We've come to accept stress as a normal part of our lives, but there's nothing normal about lighting up our brains with chemicals and shutting down half the systems in our bodies while flooding the bloodstream with sugar. Today, our bodies don't get much of a break from the stress response, which was designed to be an occasional event, not a constant condition of existence. "We've all come to believe that occasional headaches or muscle tension from stress is normal, but it isn't normal," says Tyne. "A normal body doesn't have headaches."

Stress sends a constant flow of sugar into the bloodstream to feed fleeing muscles, but with our less active modern lives, the sugar doesn't get burned up. "Having high levels of sugar in the blood is like having rust in your gas tank," says Tyne. "It flows into every part of the engine." The body responds by releasing insulin to regulate the sugar, but over time the insulin reaction degrades and the excess sugar can cause diabetes and kidney and circulation problems.

The long-term effects of cortisol aren't much better. Our metabolism slows and fat cells, particularly those around the gut, open up to receive more fat—the body's most storable source of energy. In other words, stress makes us fat. (See "Our Apple-Shaped Leaders," Page 46.) Since cavemen used all that extra sugar by fighting or fleeing, the brain evolved to react to elevated cortisol levels by craving more food, according to leading stress expert Pamela Peeke. And not just a carrot and a rice cracker. Stress wants a burger with fries—lots of fats and carbohydrates—so that you'll have the energy stored to run next time. A trip to Mickey D's a survival response? Absolutely. Your body, after all, doesn't know the difference between a tiger on the prowl and a CFO's e-mail. Fight or flight has become "stew and chew," as Peeke calls it.

Stress Not

CIO-specific suggestions for dealing with on-the-job stress, not including taking up yoga. (Not that there's anything wrong with that.)

Accept the unfairness. There are a lot of unfair things about being a CIO—for instance, trying to get people to use new systems without having any authority over them. It can all cause stress. Try to put the job in perspective. "Every morning when you get to work, imagine you're pulling up a window screen and it says, Complaint Department," says Jean Hollands, CEO of Growth and Leadership Center, which coaches executives. "Calculate how much you make per day and imagine that at the end of each day there's a slot in the door where you pull your money out. Your job is to take complaints and know you're being paid for it."

Level with people. In a previous job, Carlos Covarrubias, now CIO of Dole Fresh Flowers, avoided going into detail when businesspeople asked him technology questions. "I thought I was protecting users, but it made my discussions with them difficult," he says. It also angered the businesspeople, who experienced that as evasiveness. Now Covarrubias addresses the deeper technology issues. "It lowered my stress level," he says. "It allowed me to have a different type of conversation with executives."

Think about how you come across. "We have more CIOs sent to us than any other profession; they simply will not understand that they need to learn to read others and learn their impact on others," says Hollands. Covarrubias found this out the hard way, in a 360-degree review, when people said he was less than communicative. It stung him badly, but at least it provided him with a clear path to improve.

Take five. Breaks during the day can turn off the fight-or-flight response, at least temporarily. Shutting the door for five minutes and taking a few deep breaths helps, as does visualizing something nice, such as a vacation. These tactics can staunch the flow of stress chemicals that damage the body, says Sue Parkerson Wisner of the Department of Psychiatry and Behavioral Sciences at Duke University Medical Center.

Control what you can and delegate the rest. Feeling out of control starts the stress hormones gushing, so increase your control where you can (if one of your direct reports is doing something that annoys you, tell him to knock it off), and shift accountability for things you can't control to those who can. For example, giving businesspeople responsibility for technology projects is an alignment best practice. It's also a good way to lower your stress level.

Build a support network outside of work. Join a CIO peer group, a softball team or a church. Keep in touch with friends. Talk to them about what you're experiencing. Just don't talk about it in the office. CIOs should avoid unburdening themselves to subordinates or colleagues. Those confessions could be used against you.

–C.K.

Indeed, researchers found that Americans surveyed after Sept. 11 said their initial reaction was to avoid food (stress hormones initially suppress appetite so our caveman wouldn't get distracted while running from the tiger) followed by a tendency to overeat (the cortisol effect).

Not that stress makes it any easier to digest the food you crave. Since eating doesn't have much to do with getting away from the tiger, stress steers blood away from the digestive tract, leading to indigestion, ulcers and more. Similarly, survival was more important than attacking a cold bug, so resources are shifted away from the immune system, increasing the body's susceptibility to everything from the trivial—

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Jim Feltner, Supervisor of Telecommunications, Cherokee County School District

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colds, allergies—to the tragic—cancer, multiple sclerosis and lupus, to name a few.

But the most dramatic impact of stress is on the circulatory system. Stress runs the heart harder than a 16-year-old drives a car. The combination of stress hormones such as cortisol and adrenaline keep the heart running at a high idle. "Emergency room doctors use a shot of adrenaline to get a heart attack patient going again," says Tyne. "Imagine what that does to your heart when it's flowing constantly." But unlike a car, your heart doesn't begin to leak oil or emit the telltale odor of burning bushings as it runs down. It just stops.

For 50 percent of the people who get cardiovascular disease, death is the first symptom, according to the American Heart Association.

Stress and the CIO

Though the evidence is still being assembled, many scientists now believe that learning how to short-circuit the fight-or-flight response may be as important to our health as exercise and diet. For example, a recent Duke University study of about 100 heart disease patients divided them into three groups. The control group just had regular medical checkups, another had supervised aerobic exercise classes three times a week for four months, and the third group received stress reduction education once a week for 90 minutes during the same period. After five years, the first group had experienced 12 heart attacks, the second had seven, and the third had three. Results such as those are slowly convincing doctors to take a hard look at the mental state of their patients.

The best antidote to stress is exercise. And viewed in the context of the chemistry of the fight-or-flight response, that makes sense. Exercise is simulated flight—a chance for all the sugars and hormones in the bloodstream to be used for their intended purpose. Exercise also feeds our brains some feel-good drugs such as dopamine and beta-endorphin—evolution's reward for safely escaping the tiger.

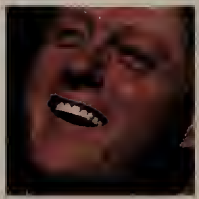
Avoiding the stress response itself—feeling less stress in the first place—is a lot harder. To understand how to control stress, you have to think yourself back to the caves. Three major psychological factors made cavemen's stress hormones flow: lack of control, fear and isolation. All three have modern correlatives.

The CIO role is tailor-made for feeling out of control. Infrastructures can crash at any moment, CEOs can change their minds and stop funding projects, businesspeople can resist using your beautiful new system for no good reason. CIOs have a vast amount of responsibility but little authority for controlling outcomes. This is what psychologists call low decision latitude.

"This creates a sense of chronic powerlessness," says Scott Stacy, clinical program director for the Professional Renewal Center, which counsels executives on stress. "You can't have an effect on what you need to have an effect on to generate a sense of [internal] calm." This leads directly to health problems. According to a 1997 study of about 3,000 Canadian public-service executives, those with low decision latitude saw their risk of illness increase anywhere from 30 percent to 1,700 percent.

Our Apple-Shaped Leaders

One classic sign of stress is the tendency to get fat around the middle. For example...



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Former Russian President

DENNIS KOZLOWSKI
Ex-Tyco CEO

TED KENNEDY
Senator (D-Mass.)

These men became apple-shaped because the brain evolved to react to elevated cortisol levels in the blood by craving food. And not just carrots and rice crackers. Stress wants a burger with fries.

To see the theory in action, just ask a top CIO if she would like to report to the CFO instead of the CEO. "I wouldn't take a job that didn't report to the CEO," says Doreen Wright, CIO of Campbell Soup. "It would be far more stressful. Your scope of influence and your ability to execute is directly tied to your clout in the firm. If you're buried in finance, you can't exert the same influence."

Put in stress terms, reporting to the CFO reduces a CIO's control over his environment because it puts someone between him and the ultimate influencer over the company, the CEO.

CIOs also feel increasingly out of control as the software projects they manage get bigger and affect more people. That's more people the CIO can't control. Users don't have to do anything the CIO asks. When Gagliardi's custom manufacturing resource planning project at Unisa had its funding withdrawn earlier this year, he not only lost control over his project but also over the expectations of users.

"I had a bunch of half-developed applications and a bunch of half-trained developers, and I tried to deliver what I could, but it wasn't working out," he says. Disappointed departments began criticizing.

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So Gagliardi changed everyone's expectations, including his own. "I said we're going to stop the project and go into maintenance mode on the legacy applications until times improve," he says. "Now when my developers manage to deliver something new, it's a pleasant surprise for everybody, and they're happy to get it."

Gagliardi says that since then his stress level has gone way down. Psychologically, he achieved the control over his environment that he needed to turn off his primal sense of anxiety—and his physiological fight-or-flight response.

It's much harder for CIOs to escape the isolation that cavemen learned to dislike so much. CIOs who show stress send it rippling through their staffs like a rock thrown into a pond. Worse, CIOs who confide in their employees about the stress they feel risk having it used against them. "You need for your staff to know that you're human; you don't need your staff to know that you're weak," says the University of Texas's Quick.

Joining a CIO networking group can help relieve the loneliness, as can a deep discussion with your spouse. But neither can change a CIO's reaction to stress or offer ways to relieve it.

Indeed, CIOs who feel isolated tend to alienate those around them who could offer support. "No one understands what I'm going through, so there's no use in talking about it," is the refrain that Lee Smithson, a psychologist and executive coach for consultancy RHR International, hears a lot from the CIOs she works with.

For one of Smithson's clients, who requested anonymity, stress on the job and stress at home marched in lockstep. "He was constantly having to bargain with his wife for time, and he canceled two vacations with her and their children," Smithson says. "His wife had become hardened to the whole situation." When his company merged with another, he told his wife that he wanted to apply for a higher paying but more demanding CIO position at the new company. "She hit the roof," says Smithson.

This man's wife wasn't the only unhappy one. The new company told him that unless he revamped his approach to work and the way he handled stress, he wouldn't get the job. "He was functioning as the consummate problem-solver," says Smithson. But his obsession with controlling his stress by doing everything himself had alienated him from his staff, who wished he would delegate more often, and from his superiors, who could never track him down for important meetings. And when he did attend, he was so distracted that he usually sat in silence.

It all came out when the new company's management asked the putative CIO to take a 360-degree review. He was stunned that far from being appreciated, the 12-hour workdays he was putting in, and the evenings he spent sifting through the e-mail that had arrived while he was off putting out fires, was viewed as a problem. "He had never gotten that kind of feedback before," says Smithson. "They said he wasn't strategic and therefore wasn't qualified for the job."

Like many CIOs, this man was in denial. He had become withdrawn. Attempting to project strength, he was advertising weakness. Alone in his office cave, he was destined to become some tiger's lunch.

Fortunately, spurred by the review, he and Smithson were able to create a plan for him to distribute responsibility among his staff and become more involved in business strategy. Ultimately, he got the CIO job.

And last Spring, he took his wife and two kids to Disney World—along with a cell phone.

Executive Editor Christopher Koch usually flees on his bike. You can share your ideas on handling stress with him at *ckoch@cio.com*.

Good News For Type A Personalities

Remember that boss who said, "I don't get ulcers, I give them?" The old coot may have been on to something.

Scientists once believed that high-energy, aggressive people—so-called type A personalities—were more at risk for stress-related disorders than others. But that has proven not to be the case. In fact, some type A's enjoy stress and see it as a positive. In effect, they simply don't experience what we know as stress.

"Competitiveness does not damage your health," says psychologist Sue Parkerson Wisner of the Duke University Medical Center. Only type A's who get angry or depressed have stress-related health problems, she says.

Type A's who don't turn the steam inward have proven to be more like zebras than humans in their response to stress, a famous analogy first posed by stress researcher Robert Sapolsky in his 1994 book, *Why Zebras Don't Get Ulcers*. When faced with a threat, such as a lion springing from the bush, zebras have the same fight-or-flight response as humans. But when it's over, when their brothers and sisters are now lunch and the lions are settling down for a snooze, zebras stop worrying until the next time the lions show up. So they don't die of stress.

Psychologically healthy type A's behave the same way. When that big meeting is over, they leave their stress in the conference room. They don't worry about the next big meeting until the lions wake up. *–C.K.*

Talk to Connie Tyne

Stress got you or your staff down? Until Aug. 15, you can **ASK THE SOURCE** Connie Tyne, executive director of the Cooper Wellness Program, about **managing stress** before it manages you. To post your questions, go to **www.cio.com/ask**.

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*SOURCE: **CIO** READER PROFILE STUDY, MRI, AUGUST 2002

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SAVING MONEY, SAVING LIVES

BY SARAH D. SCALET

Health-care CIOs face intense pressure to install electronic medical records and order-entry systems, in spite of physician resistance and large up-front costs. Here's how early adopters are overcoming the obstacles.

On a gritty Brooklyn block cluttered with automobile body shops, a janitorial supplies outlet and a truck depot for Gino's Italian Ice sits a one-story building with corrugated metal siding the color of pistachio ice cream. It's an unlikely setting for a hospital IT department and an even unlikelier setting for a revolution in American health care. Yet inside, that's precisely what's going on.

Ten blocks from the 705-bed Maimonides Medical Center, Senior Vice President and CIO Ann C. Sullivan has finished a $44 million technology transformation that in seven years has taken the hospital from punched cards to a sophisticated system of electronic medical records (EMR) and computerized physician order-entry (CPOE).

Today, every one of Maimonides' doctors—not only its 277 employed physicians but also 978 community physicians with hospital privileges—log on to order medications and tests, check lab results, and track treatment. One in every five prescriptions is flagged by the system for a possible problem—an allergy or an adverse drug interaction. The average turnaround time for administering medicine to inpatients now has been cut from five hours to 90 minutes. Physicians receive all reports online from the radiology

Reader ROI

- ▸ Why the payoff from electronic medical records is so great
- ▸ What's behind the pain of implementing them
- ▸ How to win over reluctant physicians

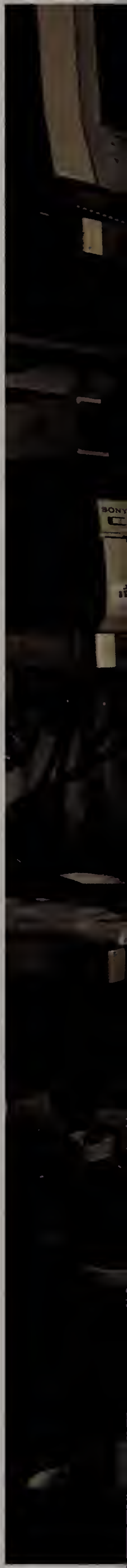


PHOTO BY ANDREW KIST

Ann Sullivan, CIO of Maimonides Medical Center in Brooklyn, N.Y., has installed an electronic records and order-entry system that boosted hospital revenue by $12.5 million last year.

department within 24 hours (formerly, it was five days), and they no longer have to reorder tests for the estimated 15 percent of film records that used to get lost. Last year, revenue increased $50 million, and hospital officials attribute a fourth of that jump in revenue to the new IT systems. In addition, the annual cost of the hospital's malpractice insurance just dropped $1 million, a savings largely credited to the new systems.

Advanced systems like these could reduce U.S. hospitalization costs by $2 billion a year. And if similar systems were used in doctors' offices and clinics as well as hospitals, they could prevent thousands of deaths from medical errors and save the U.S. health-care system a whopping $44 billion each year—taking a significant bite out of the $1.4 trillion America annually spends on health care. Health-care costs, which in 2001 constituted 14 percent of the gross domestic product, continue to soar, slicing into business profits and exacerbating state and federal deficits. An increasing number of employers are cutting back on health coverage or offering none at all. The enormous efficiencies of electronic medicine could ameliorate this deepening crisis.

The good news is that this push toward paperless medicine seems inevitable. Insurance companies have begun rewarding physicians and hospitals for using IT to reduce errors. And a 2002 survey found that 46 percent of physician executives work for organizations that have invested in EMRs or plan to do so in the next year—more than double the number reported in 2001.

The bad news is that there's still enormous resistance to these systems. At present, Maimonides Medical Center is among only 10 percent of U.S. hospitals that have implemented inpatient order-entry systems that check for errors. Most health-care entities are moving much more slowly, both because of the tremendous up-front costs (Maimonides has been spending *one-third* of its capital expenditures on IT) and resistance from physicians who see no reason for changing the way they practice.

CIOs are at the center of this tug-of-war. They're the ones who must drive this transformation, delivering systems without incurring dangerous downtime or allowing medical files to fall into the wrong hands.

"The pressures in health care are such that in the next two or three years we're going to have to achieve a new level of efficiency," says David Pecoraro, vice president and CIO of the Jewish Hospital HealthCare Services, which has installed systems similar to those at Maimonides.

"CIOs are feeling the heat."

Mark Andersen, CIO of Yale New Haven Health System, says it's important to make patients and doctors aware of the security precautions put in place to limit access to electronic medical records.

PHOTO BY TRACY KROLL

THE PROBLEM WITH PAPER

So what's wrong with a medical system based on paper? To begin with, paper gets lost. Paper degrades. And no matter how voluminous, paper files are limited in the quality and quantity of data they contain.

The goal of an EMR system is to collect the data on those pieces of paper and make it dynamic. Say, for instance, a patient has diabetes. EMRs can help a doctor track how the disease has progressed over the years, without hunting through pages of scribbled medical notes.

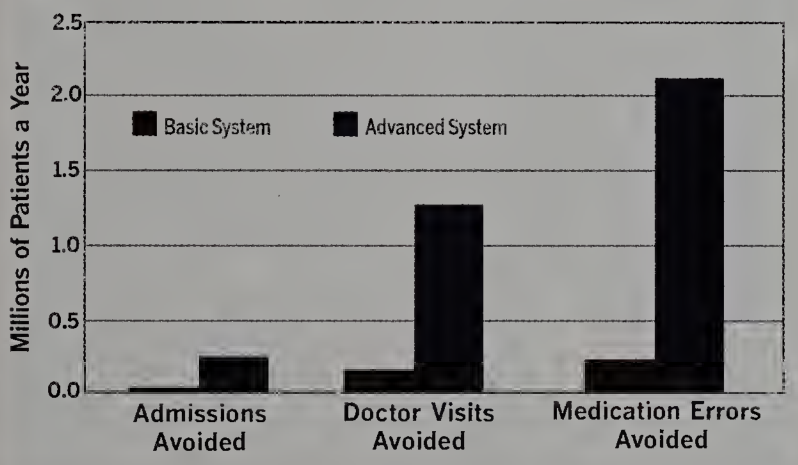
And if the system is properly coded—if, for instance, it knows that a heart attack is the same as a myocardial infarction—it can do much more than track a patient's progress. It can, for example, track patients in the aggregate to determine how well doctors are managing specific diseases. For instance, at Intermountain Health Care, a Salt Lake City-based insurance and health-care provider, officials can now see how many diabetics have acceptable levels of hemoglobin A1c—a key indicator of how well they (and by extension, their doctors) are coping. Now Intermountain issues a report card on individual physicians and can determine whether the organization is getting better at treating diabetes.

That's all good, but it gets better. Once an EMR system is in place, the next step is a CPOE system. It allows a provider to request medications, lab tests and radiology procedures like CAT scans or MRIs. Ideally, the doctor gets an automatic notification about test results. But CPOEs, like EMRs, run the gamut from simple systems that do little more than computerize a prescription pad to complex ones that check for everything from decimal point errors to drug interactions and allergies to whether recent tests show that a particular medication might be contraindicated.

Research has shown that CPOEs, tightly linked to EMRs, can prevent more than half of all serious inpatient medication errors—a political hot button ever since the Institute of Medicine issued a 1999 landmark report revealing that as many as 98,000 people a year die in hospitals from medical errors. The Leapfrog Group, a collection of insurers that has banded together to improve patient safety, has made CPOE one of its top three priorities. In California, lawmakers set a 2005 deadline requiring hospitals to submit reports on how they will use IT to reduce medical errors. New York's Empire Blue Cross Blue Shield, in an incentive program that involves four of its key accounts, IBM, PepsiCo, Verizon Communications and Xerox, already has paid out $195,000 in bonuses to New York City hospitals that met Leapfrog's standards for quality improvement.

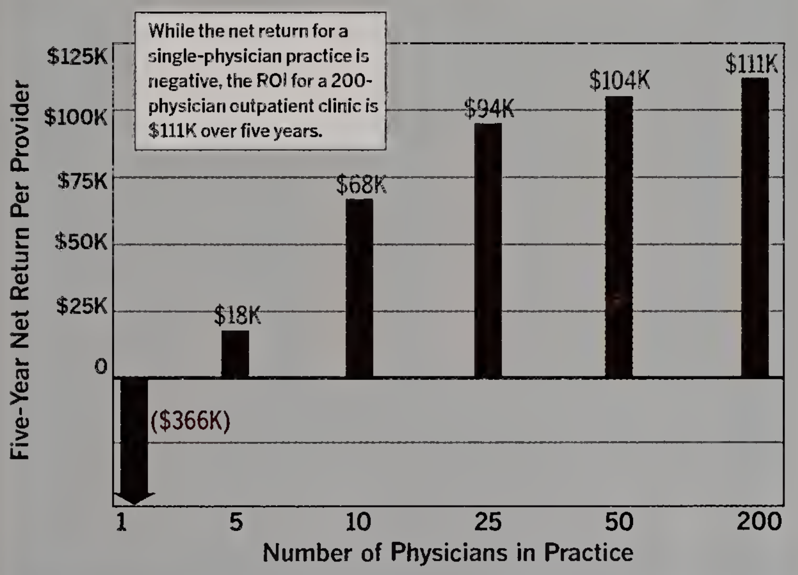
Saving Lives

Advanced outpatient systems that recommend drugs, alert physicians to order tests, and check for errors in drug dosage prevent far more errors and hospitalizations than basic systems that merely record orders.



Saving Money

The larger the medical practice or clinic, the greater the net savings from electronic drug order-entry systems. Here is the net return per provider after five years.



While the net return for a single-physician practice is negative, the ROI for a 200-physician outpatient clinic is $111K over five years.

SOURCE: CENTER FOR INFORMATION TECHNOLOGY LEADERSHIP (*WWW.CITL.ORG*)

PHYSICIAN RESISTANCE

While there is increasing pressure to convert to electronic patient systems, getting there won't be easy. "This is worse than taking a horse to water and making him drink," says Greg Walton, CIO of Carilion Health System in Roanoke, Va. "This is more like teaching horses to dig wells."

That's because EMRs in general, and CPOE systems in particular, require that physicians change the way they practice medicine. It starts with the most fundamental question of how can doctors look at a patient and a computer screen at the same time, and only gets more complicated.

Fortunately, the CIO who wins over the horse gets the whole barn. Physicians—not boards of directors, not insurance companies, not even patients—are the ones who really need to be convinced that newfangled IT systems are worth their time and money. If a doctor, especially a good one, doesn't like the way one hospital is doing something, she can take her business—and her patients—elsewhere.

The value proposition is especially difficult for physicians in private practice who have to pay for the systems out of their own earnings (see "The Private Practice Value Proposition," Page 56). But even in hospitals, where there are economies of scale, CIOs have found CPOE systems a hard sell.

Speedier lab results is one key selling point. Quick, wireless access to clinical data is another (see "Wireless: Just What the Doctor Ordered," Page 60). Remote access, so that doctors can log on from home or the office to check on the status of a patient in the hospital, is yet another.

Ultimately, the best selling point is the simple fact that these systems improve patient care. "It's the right thing to do," says Mark Andersen, CIO of Yale New Haven Health System.

DOCTORS ON BOARD

As has historically been the case with IT, success usually starts with a few early adopters. That's what Dr. Robert Kolodner, acting deputy CIO for health at the Department of Veterans Affairs and acting chief health informatics officer for the Veterans Health Administration, has found. "You go with the people who are excited and willing to try things out early on," says Kolodner, whose federally funded organization has given all 163 of its facilities access to EMRs and CPOEs. "You kind of work out the kinks—there are always kinks—with the group that will be much more tolerant when things don't go completely right."

These systems don't succeed unless clinicians are involved from the get-go. Many IT shops with successful EMR implementations have doctors, nurses and pharmacists on staff who spend part of their time in IT and part of their time with patients and medical peers. This helps give the CIO credibility, but it also makes the systems work. With earlier versions of CPOEs and EMRs, IT departments had to build in error-checking functions and definitions by themselves. Now, vendors are building more rules and definitions into the products, but individual hospitals still need to modify the systems to fit their policies.

For example, at Kaiser Permanente Northwest, the EMR system used to issue alerts for all female patients who were due for mammograms. Physicians showed that some patients didn't want the tests (for cultural reasons) or didn't need them (because they'd had mastectomies). "We needed to find a mechanism to turn off the alert for certain patients," says Dr. Homer Chin, Kaiser's assistant regional medical director for clinical information systems. "There are thousands of little things like that." Working closely with the vendor, Chin's group has fixed a number of these kinks, and now Kaiser is planning to roll out the Northwest system to the organization nationwide, to the tune of $1.8 billion over 10 years.

Bottom line: It pays to listen to your doctors. But dealing with them takes patience. The more physicians use the system, the more tweaking needs to be done. Intermountain Health Care, for instance, has managed to get physicians to enter patient notes directly into the computer systems. To get there, the IT department worked closely with physicians to develop what CIO Carvel Whiting calls "hot text"—templates that physicians can pull up for certain types of visits and fill out with just a few keystrokes.

Whiting now has some happy customers. "I was in a meeting a while ago with a number of docs in our clinics, and they said, 'If I had to do this the old way it would take me an extra hour-and-a-half a day,'" he says.

But new systems mean new expectations; now physicians won't put up with any downtime.

NEW HEADACHES

No one remembers what life at Yale-New Haven Hospital was like before the CPOE system. So when it is taken down—which happens every month for scheduled maintenance—"you can't say, Do what you did before," says Howard Goldberg, the hospital's director of clinical systems, who reports to CIO Andersen. "When you've been up for 11 years, there *is* no before. Doctors don't know how to write an order by hand." That's where a portable gray file box stashed in every unit comes in handy. Inside the file box are instructions and prescription and other order forms.

Yes, paper.

But the chief of staff is putting pressure on Andersen to get rid of the paper. So, as part of an upgrade while converting to a new version of CPOE software, Andersen is split-

The Private Practice Value Proposition

To entice doctors to pay for advanced systems, the health-care industry has to find the sweet spot where good medicine and good business intersect

If you think getting hospital physicians to use a computerized physician order-entry (CPOE) system is a tough sell, you're right. But convincing physicians to *pay* for a CPOE in their own practices is even harder. Yet that's precisely where the greatest benefits will be found.

The Center for Information Technology Leadership (CITL), a research organization founded by Partners HealthCare System in Boston, estimates that advanced CPOE in outpatient settings could save the U.S. health-care system $44 billion a year. The systems save money not only by preventing errors but also by suggesting less expensive drugs and avoiding unnecessary or duplicate lab tests. The problem is, these savings don't necessarily go to doctors, despite the fact that they're the ones being asked to foot the bill for the systems.

With a big enough practice, economies of scale do kick in. CITL estimates that for a practice with 50 providers, the net savings on installing these systems would be $104,000 per provider over five years. But 75 percent of U.S. physicians practice in a group with five or fewer doctors, where the numbers are not so enticing. Dr. Blackford Middleton, CITL's chairman, says that an advanced CPOE costs each physician in a five-person practice $122,000 for the first five years—or about $25,000 per doctor per year.

Partners is trying to improve the value proposition by changing its managed care contracts to a pay-for-performance model. In this kind of system, physicians' pay is based on not just what they do but on how well they do it. A physician might get extra credit for prescribing a generic drug rather than a brand name one, or for having a diabetic pass certain checks—all things that can be done and then proven much more easily digitally than with paper-based systems.

Employers are also beginning to offer similar incentives. Bridges to Excellence, which involves corporate heavyweights like Ford, GE and Procter & Gamble, is offering qualifying physicians a $55 bonus per patient for improved care.

John Glaser, vice president and CIO of Partners HealthCare and a member of CITL's executive committee, hopes programs like these will help make the inconvenience and up-front costs of CPOE worth the physician's while. "People paint doctors as technophobes," he says. "That's just not true. But they do want to know the value. You have to have a pretty good case for why you're going to bother with this." *–S.S.*

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ting the data between two separate data centers three-quarters of a mile apart. Andersen knows what some other health-care CIOs, like John Halamka of CareGroup in Boston, have learned the hard way: The more mission-critical hospital IT systems become, the greater the risks of downtime (read "All Systems Down" at *www.cio.com/printlinks*).

Making sure the network is crash-proof is only part of the CIO's problem. Not only are health-care organizations making patient files electronic, they're putting them online for remote access by doctors and even, in a few pilot programs, by patients.

This raises new privacy and security concerns. What happens if someone breaks into a database of health information and uses it to embarrass patients, commit identity theft or even make a profit on the black market—say, by selling medical records to unscrupulous mortgage companies looking for reasons not to grant loans?

These are valid enough concerns that the federal government, with the passage of the Health Insurance Portability and Accountability Act (HIPAA), has set strict rules around how patient data must be secured and in what cases it may be shared outside the organization. (For more, read "Immune Systems" at *www.cio.com/printlinks*.)

Health-care entities have to do a better job of explaining their safety precautions. At Yale-New Haven, for instance, a few patients bristled when the time came to upgrade the AIDS clinic with an EMR system because they were worried their personal information would fall into the wrong hands. Yale-New Haven officials took pains to explain that only certain people would have access to those files. What's more, hospital officials can see who is looking at which files and when. "Once our analyst was able to show the patients that we could now document everybody who looked at their record, they actually felt more comfortable," Andersen says.

GETTING TO THE INEVITABLE

Despite the benefits of EMRs, there will always be some clinicians who don't want to change. That's where CIOs must rely on executive backup: a mandate, straight from the top, that everyone—no exceptions—will use the EMR and CPOE systems.

Hospital administrators "need to communicate the target and hold a gentle, steady pressure to achieve it," VA's Kolodner says. "After about six months, if you've put in a system that meets the providers' needs, it becomes self-sustaining. The peers start saying, Would you please put your notes in there? I don't want to have to get the records because it slows me down."

This mandate is hard enough to enforce at places like the VA facilities, where physicians are on staff and rely on paychecks. But it's most difficult at community hospitals that don't have power over doctors who aren't employees.

Just ask Maimonides' Sullivan. "We went live with an electronic record order-entry system on Dec. 15, 1996," she says. "I remember the day well. One doctor walked up to me in the hospital. He said that because of the system, he was going to retire."

Fortunately, he was the only doctor who left. Today, Sullivan's systems are cranking away—saving money, saving lives. In the emergency department, the floor and hallways are crowded with patients on stretchers. Police keep close guard over one patient, while another, blood caked below one eye, yells "doctor" every few seconds. The scene seems chaotic, but appearances can be deceiving.

Dr. Steven Davidson, chairman of the emergency medicine department, logs on to a computer. At a glance, he can see the locations of all the ER patients, the severity of their conditions, the status of their treatments. He knows that an elderly woman in the hallway needs to be assigned a room, that another patient's chest X-ray is back from the lab. Dressed in a bow tie and lab coat, Davidson is imposing order on the chaos. "[I knew] there had to be something medicine could use from the business model," he says over the racket.

He was right. CIO

Sarah D. Scalet is a senior writer for *CIO*. Send feedback to Executive Editor Alison Bass via e-mail at abass@cio.com.

How to Become Paperless

Eight tips for success from CIOs who have been there, done that

1. **THINK LIKE A DOCTOR.** Treat an electronic medical records (EMR) system like a clinical project, not an IT one. Many hospital IT departments pay a share of the salaries of physicians, nurses and pharmacists who spend part of their time in IT and part of their time with patients.
2. **DON'T SKIMP ON TRAINING.** For the most effective results, consider one-on-one training for physicians rather than classroom instruction.
3. **PREPARE FOR A PRODUCTIVITY HIT ANYWAY.** EMRs have a huge impact on how clinicians do their daily work.
4. **THINK OF RESISTANCE AS FEEDBACK.** Most of the physicians who push back will have valid points and concerns.
5. **START WITH THE VALUE.** Once physicians get something out of the EMR—like faster lab-test results—they'll be more likely to accept further changes.
6. **EXPECT PROBLEMS.** Have backup processes in case the system goes down.
7. **BE READY TO MAKE CHANGES.** The real work begins after the implementation, when clinicians will want to fix problems and add functionality.
8. **GET AN EXECUTIVE MANDATE.** The CEO must require everyone to use the new systems, but this should only be your final nudge toward adoption. –S.S.

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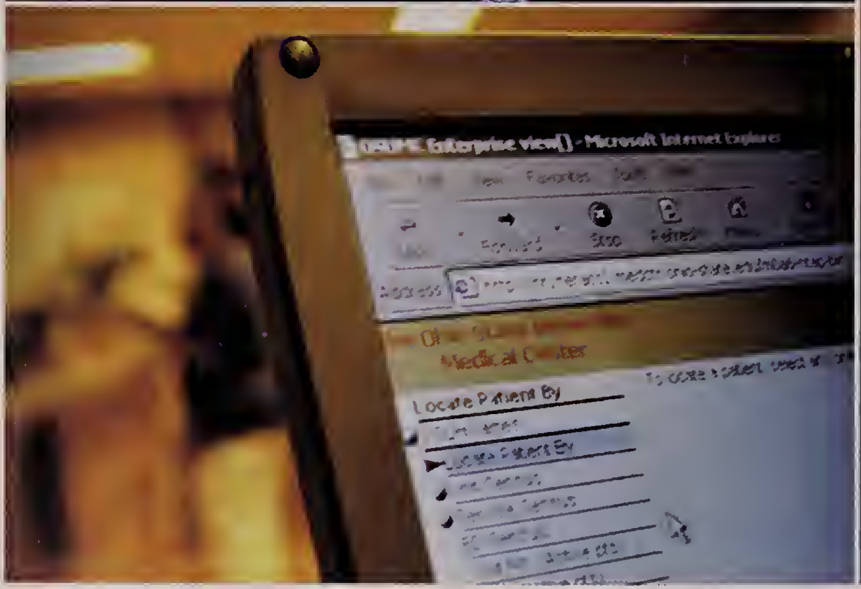

"If you're not entering data as you go, a lot of efficiency is lost," says OSU Medical Center's Dr. Andrew Thomas (above, right), who's getting that efficiency through Enterprise Systems Director Phil Skinner's (above, left) wireless systems.

A Special Two-Part Report on IT & Health Care | Part 2: Mobile Medicine

PHOTOGRAPHY BY STEPHEN WEBSTER

WIRELESS: JUST WHAT THE DOCTOR ORDERED

BY GALEN GRUMAN

As medical records go electronic, hospital CIOs are finding that wireless networks can get the records to where the doctors and nurses want to use them. CIOs in other industries would do well to watch and learn.

Electronic medical records systems top hospital CIOs' agendas because they can prevent errors, enforce standards, make staff more efficient, simplify record keeping and improve patient care.

But the systems deliver only when doctors, nurses and other medical staff actually use them.

In hospitals, where patients and medical staff are constantly moving, it's difficult for staff members to take a break to enter patient data, or to order tests and medications. So, even though many hospitals began installing data-access terminals a decade ago at nurses' stations and near hospital wards, staff members still tend to scribble notes a few hours before they enter data and place orders. That can lead to transcription errors, delays in test results and incomplete records when other staff look up a patient's status.

Health-care information has to be available anytime, anywhere. "We didn't see any other way to do it other than wireless," says Tim Stettheimer, vice president and CIO of St. Vincent's Hospital in Birmingham, Ala.

"If you're not entering data as you go, a lot of efficiency is lost. With paper, it sits in a pocket for an hour, then sits in a bin," says Dr. Andrew Thomas, assistant dean and internal medicine professor at Ohio State University (OSU) Medical Center, a teaching hospital in Columbus, Ohio.

That's why wireless systems, especially those based on the 802.11b standard (also known as Wi-Fi), are more widely deployed. This new conduit lets staff access and update records and make orders at the

Reader ROI

- Why wireless is a key technology for electronic medical records systems
- What other industries can learn from hospital wireless projects
- How CIOs can use wireless networks to support voice and other applications

point of care. That reduces errors and delays, and fits into the doctors' and nurses' workflow. And they're inexpensive to deploy, costing a few percent of the total budget of an electronic medical records (EMR) system. Plus, they can be a springboard to services such as communications badges and mobile sensors. (See "Where Health Care Leads the Way," this page.)

MORE PATIENT FACE TIME

Dr. Bruce Brown, a physician at St. Vincent's, says he believes using mobile technology to access and update medical records will help him spend more time with patients.

Before Brown began using a wireless wearable computer from Xybernaut, complete with an LCD screen mounted on his glasses, he commuted between his patients and hills of paper. "I used to work on a stack of papers, then see the patient, then go back to the patient's stack of papers," he says. "I spent only 20 percent of my time on a patient in front of me." With wireless systems, where he can access records and order needed tests while still with the patient, "I expect that to increase to 50 to 60 percent." Brown has also seen the cycle time per patient—from diagnosis to test result and later to delivery of treatment to the patient—shrink from 24 hours using the old-fashioned paper methods to four or five hours with the combination of EMR and wireless systems.

Wireless makes productivity sense whenever workers are mobile and work with time-critical data, says Chris Kozup, a Meta Group analyst. And, notes Kathryn Korostoff, president of consultancy Sage Research, the use of wireless can also relieve staff constraints. "Hospitals are always understaffed," she says. "In the face of economic hardship, wireless has a payback scenario. It's not a huge amount of capital investment. They're clearly saving time for doctors and nurses, which is their greatest asset." For the users, "it really becomes a part of their job satisfaction—it relieves stress. It has a major effect on how people are satisfied with their job," she adds.

However, wireless and mobile technologies have supported mission-critical needs only in the past few years, and hospitals deploying the new systems continue to wrestle with the best ways to deploy them and integrate them into their overall IT structure. While wireless network security has become a straightforward issue for CIOs to address, several other technology hurdles continue to require experimentation and greater heterogeneity than many IT departments would prefer to support.

Hospitals are early wireless adopters, and the issues they face and the benefits they achieve apply to any industry—professional services, retail, inventory warehouses—that has mobile workers within a building, Korostoff says.

AT THE CORE: LAPTOPS ON CARTS

Hospitals' wireless deployments typically involve setting up 802.11b access points in patient wards, treatment facilities and in corridors in which patients travel. Wirelessly enabled laptops affixed to carts are rolled from bed to bed and ward to ward as needed so that doctors and nurses can access medical records and order tests and medications wherever they are.

Usually, these shared laptops complement existing wired desktops installed at nurses' stations and other locations during earlier-generation attempts to digitize medical records. Wireless tablets and sometimes PDAs often supplement these laptops, either to provide staff with a dedicated device or for use in other medical activities.

Some hospitals keep the mix of devices

Where Health Care Leads the Way

Hospital CIOs pioneer wireless voice and productivity apps

ALTHOUGH electronic medical records systems are driving wireless adoption, hospital CIOs see many more uses for that network infrastructure once it's in place. When it comes to wireless, hospitals are pioneers in these areas.

Voice over wireless. At top of the list is the use of voice over wireless IP (VoWIP) so that staff members can call each other without having to find a phone. In Springfield, Ill., the Memorial Medical Center and its neighboring St. John's Hospital are each testing several VoWIP phones this summer. And St. Vincent's Hospital in Birmingham, Ala., is testing a hands-free communications badge from Vocera Communications. "The biggest educational issue is to respect privacy in calls," says CIO Tim Stettheimer. The hospital also had to adjust access point locations because the badges have a relatively small transmission range.

Transcription. Transcribing doctors' dictations costs $15,000 to $30,000 per year for most hospital doctors, says Dr. Bruce Brown of St. Vincent's, which is looking at PDA-delivered dictation. And it's using tablet PCs with voice recognition capabilities.

At Ohio State University Medical Center, Dr. Andrew Thomas is looking forward to dictation capabilities on devices that will transmit the audio files to a transcription service, which will then e-mail the text back.

Internet access. Stettheimer also wants to provide wireless Internet access to patients and visitors. "I want to be able to do the same thing as Starbucks. I want that Wi-Fi label on the door," he says. "We recently upgraded our Cisco access points to allow multiple virtual LANs for that purpose. It's a matter of taking care of the entire person, and [computer access is] an aspect of that care."

Delivery robots. Manufactured by FMC, the 40 machines will deliver food, linens and supplies throughout the Ohio State University Medical Center, accessing their task lists and guidance information over the 802.11b network. *–G.G.*

We take the Wal-Mart approach to wireless investment: It must be affordable and present benefits up front, so it usually has to be modular. –St. Vincent's CIO Tim Stettheimer

limited, while others let doctors choose almost anything to encourage usage. "We have not found there is one perfect answer to how people access information: wired PCs, laptops on carts, tablets, PDAs," says St. Vincent's CIO Stettheimer.

Consider four hospital deployments:

- **OSU Medical Center** has more than 1,100 medical staffers who care for 33,000 inpatients and 625,000 outpatients every year. It has set up 220 access points and 180 notebooks on carts. Although OSU hasn't tracked its wireless costs separately, Enterprise Systems Director Phil Skinner figures it costs $600 per device—whether it's a PDA, access point or wireless card—including setup, software and hardware.

- **St. Vincent's** has a similar setup of 168 access points and 18 notebooks for its 600 medical staff members (on average, 40 people per day access the wireless network). The hospital cares for 19,000 inpatients and sees 140,000 outpatients every year. St. Vincent's has three tablets dedicated to registration at patient beds, so patients don't have to wait in a lobby, as well as 12 wireless notebooks used by technical and administrative staff.

This fall, St. Vincent's will install an electronic order-entry system for physicians, which will be available over 100 wireless PDAs and 60 tablets, as well as more than 200 existing wired bedside computers. Stettheimer figures the wireless infrastructure cost about $1 million, out of the hospital's $45 million investment in IT.

- **Memorial Medical Center** in Springfield, Ill., a teaching hospital affiliated with Southern Illinois University, also took this route for its wireless deployment. The hospital, whose 550 physicians care for 22,000 inpatients and 450,000 outpatients, has about 150 access points for an initial six notebooks. CIO O.J. Wolanyk expects the number to grow dramatically after the first users talk about their experiences and as the hospital runs out of room for stationary terminals. The wireless system cost $900,000 out of the three-year, $30 million EMR effort.

- **St. John's Hospital**, a block away from Memorial, is focused on using wireless handheld scanners to record medication delivery; patients' wristbands, drug labels and nurses' badges are all bar-coded. A nurse scans all three so that the system can immediately track which nurse gave which patient which medication at what time, says IS Director Gordon Lashmett. St. John's is implementing a wireless system like Memorial's while it also completes its EMR rollout.

The common theme: inexpensive records access. "The investment is not atrocious," says St. Vincent's Stettheimer. "We take the Wal-Mart approach: It must be affordable and present benefits up front, so it also usually has to be modular, since health budgets are very tight."

Despite these fiscal requirements, St. Vincent's has extended the wireless network to cover the entire hospital, including the wing housing doctors' offices (already wired for Ethernet connections). Memorial originally planned on having 802.11b wireless access in just a few locations that were difficult to wire or where staff was very mobile, such as in patient wards, but Wolanyk argued that it made more sense to make the entire hospital wireless—including the parking structures and cafeterias—so that doctors and nurses can access information anywhere.

DEPLOYMENT HURDLES

Deploying wireless laptops has its challenges. Here's a rundown:

1. Battery life. Surprisingly, security and network management don't top the list. Battery life does, whether that means a laptop, a PDA or tablet computer. "It's hard to replace batteries a lot—charge, drain, recharge," notes OSU's Thomas. Worse, staff members tend not to notify IT if a laptop battery is drained or if the computer is not working, since the laptops are shared with 40 other users and thus no one's direct responsibility. To encourage staff members to plug notebooks into outlets to be recharged, OSU will raise the outlets' height as it remodels units, he says.

Battery life is also an issue for PDAs, which usually can't be plugged in to recharge. Still, says St. Vincent's Stettheimer, some physicians take them and live with the four-hour battery times.

2. Security and network management. The typical IT concerns of security and network management are largely handled by the current generation of wireless routers and gateways. "Wide area wireless doesn't require that much expertise. The device is doing the network implementation," notes Mark Lowenstein, head of consultancy Mobile Ecosystem.

That doesn't mean hospitals simply plug in access points. Instead, they connect access points via wireless routers such as those from Bluesocket, Cisco Systems, ReefEdge and Vernier Networks, as well as use management software such as those from Wavelink and XcelleNet. And they implement a host of access controls: virtual LANs, policies for user IDs and passwords, authentication tools such as MAC addresses (the unique media access control ID for each device on a network), the 802.1x wireless authentication standard, and basic key-oriented encryption such as the wired equivalency protocol (WEP). Some hospital network managers also use intrusion detection software and hardware.

3. Network performance. Even with secu-

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rity vigilance, traditional network implementation issues remain. For example, the use of routers and virtual LANs can introduce some delays as users roam among access points, notes Stettheimer: Smaller devices such as PDAs that have less powerful radios to save on battery life are more likely to drop connections as a user roams, he says, while some access points don't reliably forward user log-in information to the next access point as the person roams.

Reconfiguring access points' radio power levels solved the first issue, while upgrading access point firmware addressed the other. Stettheimer's staff also had to adjust LAN settings to optimize traffic between the wireless and wired segments to prevent signal gaps that caused firewalls to reject some roaming users.

Ironically, it's the use of standard network security tools that can create hand-off issues among wireless access points, says Meta Group's Kozup. The 802.11b standard allows for and enforces efficient roaming, he says, but the use of security mechanisms separates the unified 802.11 networks into segments. The need to reauthenticate users when they pass from one network segment into another can lead to service disruptions. Some of this may get simpler as wireless standards are updated, Kozup says.

4. Access-point placement. This is not so much a hurdle as an important consideration. Wolanyk of Memorial Medical says he originally thought he would need 300 access points to provide wireless network coverage. A radio-placement consultant helped him cut that in half, and in the process paid for its fee, he adds.

NOT READY FOR PRIME TIME

Tablet PCs and slate computers are all on hospitals' radars because they are most akin to familiar notepads, but none are yet appropriate for deployment.

"We looked at Fujitsu and ViewSonic slates, but the battery is gone in two hours," recalls OSU's Thomas. "When the battery died, you had to reload the drivers for the device because everything is in memory."

St. Vincent's is testing 20 tablets from different manufacturers. Whatever tablets Stettheimer selects, he will not store data on them, even if he takes advantage of their processing power to offload work from the servers. That's already the policy for PDAs: no data stored on the devices. Instead, he uses XML on the handhelds to query the EMR system for information that is read-only on the device screen.

ONGOING EXPERIMENTATION

Wireless technology is still new and evolving, so hospital wireless systems—just like their EMR systems—will evolve for years, and hospitals will choose different paths for their deployments.

"We're right there on the edge. We can see it, but it's not quite there," says Stettheimer about personal hospital information technology.

Meanwhile, doctors are used to changing their diagnostic technology annually, St. Vincent's Brown says. At the same time, a more technically savvy crop of doctors is entering the field, adds Brown, who prides himself on finding technology for doctors faster than his IT department. (OSU, for example, will give entering medical students the new Palm Tungstens this year, mostly to try out the new audio capability for dictation.)

It will take an openness to experimentation by both users and IT managers to ensure that wireless and mobile technologies deliver on their promise in today's increasingly IT-based medical practice.

Galen Gruman is a San Francisco-based freelance writer. Send your comments to *letters@cio.com*.

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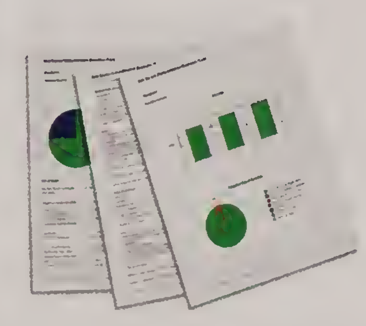

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CIOs are paying higher prices for software while small inventors and industry giants threaten each other with software patents. Has the venerable patent system finally broken down?

THE GREAT DEBATE

NOW THAT THE COURTS HAVE BEGUN RESPECTING SOFTWARE PATENTS, BIG SOFTWARE COMPANIES have rushed to patent everything they have. Some argue that this stampede, rather than protecting innovation, actually harms it, reducing choice and raising costs for the CIO. They say the software industry is so complex and ubiquitous that our patent system isn't equipped to protect software developers and CIOs. Instead, it rewards big companies that acquire broad software patents, charge competitors hefty license fees, bleed the market dry of choice and use their deep pockets to defend their vast patent portfolios in court.

Defenders of the system say that while we have indeed hit a bad patch—with too many broad patents and too much litigation—we're simply seeing history repeat itself. There is always a period of turmoil when a "new" technology is patented, with a flurry of patents and court fights until things settle down and we see that patents do what they have always done: reward innovators for their intellectual curiosity, and protect them from copycats.

One thing is clear: The U.S. Patent and Trade Office (USPTO) is overwhelmed, both by the volume and complexity of software patent applications. We asked two experienced patent attorneys to argue the two sides of the case so that you can decide: Is the patent system breaking down, or is patience a virtue?

Reader ROI

- How patents affect the cost of your software
- Why you need a patent portfolio
- What you can do to improve the patent system

Patents: An Expensive Tax on the CIO

BY LAWRENCE ROSEN

CON

SOFTWARE PATENTS cost you money. Like taxes, they skim from your profit margins, but in this case the fees go to pay for other companies' intellectual property.

For example, your e-mail program, Internet browser and word processor (all patentable) may carry a 5 percent to 10 percent patent license fee. If patented software is embedded in your products or services and the patent holder takes you to court, you could find yourself paying the same markup. Most important, what if this expense comes as a surprise, when a patent holder demands royalties for a patent you didn't even know existed? How would a sudden 5 percent to 10 percent price hike in your product affect your sales, your profits?

That example is not hypothetical. I represented a small computer hardware company that was recently sued, along with 210 other companies, for infringement of a 1985 software patent for processing color images for scanners. My client was unaware of the patent. The plaintiff sought damages in the form of a "reasonable royalty" going

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OVER SOFTWARE PATENTS

Patents: A Small Price to Pay for Progress

BY MARK RADCLIFFE

PRO

BARBED WIRE may not seem to have much to do with software, but both stirred a lot of controversy when they were first patented. In the 19th century, there were 570 different patents on barbed wire, and the legal fights between the different patent owners lasted for years. Yet the Western pioneers had plenty of barbed wire to stake their claims.

Today, we're seeing a similar controversy with software patents. In the early stage of any new technology's development, the scope of some issued patents may be overly broad. Yet such problems have all been resolved over time, and inventors have always been rewarded for their innovations while being protected from those who want to co-opt their work.

For CIOs, the issue is not whether patents should be granted for software but whether anything can be done to improve the quality of the granted patents. The problem relates more to the examining process in the USPTO

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CON

LAWRENCE ROSEN

An Expensive Tax on the CIO

Continued from Page 67

back six years. Guess who will pay that royalty? Customers. As far as I know, the lawsuit is still going on, at a probable cost in attorneys' fees alone of $100K per month.

Big software companies create portfolios of thousands of patents (for example, IBM has more than 27,000; Microsoft has 2,400) designed to legally monopolize innovation. Every large company now seeks a patent portfolio relevant to its areas of business to use as a bargaining chip with competitors. They stack their patent portfolios on conference room tables, weigh them against their competitors', and negotiate cross-licensing fees. Small startups usually don't have the resources to build a stack of patents and may avoid the market altogether, limiting choice for CIOs. Regardless, this defensive rush to the patent office is driving up costs—and therefore, prices—for everyone involved.

When CIOs buy software, they often seek patent indemnification—the software company agrees to fight any infringement claims against you as well as itself—but costs are capped by the vendor, most of whom have shallow pockets. And no indemnity provision would ever cover you if you combined patented technology with your own systems.

Worse, the only way to know whether you've violated specific patents is to evaluate those patents one by one. But the very struc-

Patent, Copyright and Trade Secret—What's the Difference?

THE INTELLECTUAL PROPERTY in software can be protected three ways: patents, copyrights and trade secrets. Patents protect "inventions" that are useful, nonobvious and novel, and must be approved by the U.S. Patent and Trademark Office. The scope of the final patent may be quite different than the initial application.

Copyright law applies to "works of authorship" that are fixed in a tangible medium of expression (such as a CD or a book), and applies automatically (a filing with the U.S. Copyright Office is required prior to bringing a lawsuit). Thus, the code of virtually all software is automatically protected by copyright. Copyright prohibits the reproduction, distribution, modification, public performance and public display of software that is "substantially similar" to the original software. If the software is protected only by copyright, anyone can avoid paying a license fee by re-creating the software from scratch without copying it. That is not usually practical, of course, but it does set some limits on what copyright holders can demand in their software licenses. If the price of existing software is too high, competitors will simply rewrite the software from scratch.

Finally, trade secret law protects any information that is not "commonly known" and which the company has taken reasonable steps to keep in confidence. The protection is more limited than patent and copyright protection: Trade secret law prevents only misappropriation, which means wrongful taking. Trade secret law could protect secrets in the source code of the software, for example. *–L.R. and M.R.*

PRO

MARK RADCLIFFE

A Small Price to Pay for Progress

Continued from Page 67

than to the appropriateness of patents for software. CIOs who are concerned about overly broad patents can lobby for more thorough examination of patent applications by the USPTO or request that an already established patent be reexamined, for example. And, in fact, the USPTO recently implemented a program for closer review for business method patent applications ("one-click" ordering on a website, for example) because of public concern about overly broad protection for business methods.

There's a good reason your software vendors take out a patent: They spend millions—even billions—to develop their products. Patents and licensing fees are some of the ways they get compensated for their efforts. Patent license fees may push up the cost of software to CIOs, but those fees don't begin to compensate companies for the money they put into software development.

That said, CIOs shouldn't simply ignore the patent licensing issue and pay up whenever asked. They should develop (or acquire through purchase) a defensive portfolio of software patents to use as a bargaining chip when faced with another company's patents. By offering to license your patents—or by threatening to assert your patents—it may be possible to avoid simply giving in to their demands or fighting a lengthy and costly legal battle. Sure, acquiring a patent portfolio is an extra cost and a management headache, but it beats going to court: An American Bar Association study estimates that an average patent case costs each side $2 million in attorney and expert fees through the end of trial, not including the cost of an appeal.

CIOs also need to understand misconceptions about software patents so that they can act as informed advisers to the business. Here are three of the biggest myths.

Myth #1 PATENTS FAVOR LARGE CORPORATIONS AND PENALIZE SMALL COMPANIES AND INDIVIDUALS. Without patents, new companies may not be able to establish themselves in the marketplace or deter large competitors from providing similar functionality. For example, small software vendor Stac Electronics stopped giant Microsoft in its tracks in 1993, after Microsoft included file compression functionality—which had been patented by Stac—in Windows. A court injunction prevented Microsoft from selling Windows, and within a week Microsoft settled the lawsuit by payture of the software industry makes evaluating the torrent of new patents each year impossible. Software is complex and ubiquitous. Developers from around the world cooperate to write software—especially in the open-source community—but patents are national and vary widely from country to country. The analysis task is monumental.

Sometimes the cost of patents is even greater than a licensing fee—it could mean shutting down the business. That's because a patent owner is not required to license his patent. Kodak had to shutter its instant camera business when patent owner Polaroid felt threatened by competition. Could your programming budget survive a sudden requirement to design around a software patent, assuming it is technically feasible?

Please understand that I'm not arguing against patents—they are here to stay. But I do believe that the system for software and business method patents is even more broken than in other industries. Software technology is evolving far more rapidly than most other fields, with product development and marketing cycles measured in months rather than years.

Even the USPTO can't keep up. It is trying valiantly to improve the analysis of patent applications, but to do that, of course, it has to compete for skilled workers who can make much more money in the private sector.

So what can be done? One of the goals of patent holders is to monopolize innovation in an industry—indeed, it's perfectly legal. But thoughtful people are now proposing that monopolies be more limited or disallowed altogether for essential technologies such as drugs for life-threatening diseases. The same limitations could be applied to essential software and business methods.

Shortening the current 20-year term of patents would also help. With technology changing so rapidly, few patent holders would be hurt, and it would embolden everyone to innovate more quickly and spend less time playing defense. While Congress is at it, it should make patent holders license essential technology to anyone who wants to use it.

The challenge is to find a proper balance between the rights of companies to obtain patents and the rights of software users to access the basic building blocks of the information economy. Today, the balance is not there.

Lawrence Rosen is founding partner of Rosenlaw.com, a Redwood City, Calif.-based technology law firm (*www.rosenlaw.com*), and is corporate secretary and general counsel of Open Source Initiative (*www.opensource.org*).

Share Your Opinion

Have you run up against patent trouble with software vendors? Go to the **ADD A COMMENT** box on the online version of this article, and let us know what's on your mind. Find "The Great Debate Over Software Patents" online at **www.cio.com/080103.**

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ing Stac $120 million. In addition, antitrust laws severely limit the manner in which companies can use their patents. For example, requiring the purchase of an unpatented product to obtain a patented product is illegal.

Myth #2 PATENTS ARE TOO BROAD AND COVER THE ENTIRE SOFTWARE PROGRAM. Because patents require sufficient disclosure of an invention to enable others to practice it, there is a misconception that they cover everything disclosed. Patent protection extends only to what is claimed, not to everything in the entire software program (or even all of the material in the patent). Software developers can learn about advances in software through reviewing patents and can use those advances in their own products if they are not claimed in those patents.

CIOs shouldn't simply ignore the patent licensing issue and pay up to any vendor that demands fees. They should develop (or acquire) a defensive portfolio of software patents to use as a bargaining chip.

Myth #3 SOFTWARE IS INTANGIBLE AND IS DIFFERENT FROM OTHER TECHNOLOGIES. Software that controls the operation of a computer is certainly an "intangible" process, but no less protectable than other more tangible processes, such as the manufacture of pharmaceutical products or semiconductors. It is not the software code that is patentable. Rather, the processes that are performed by a computer executing the code are what can be patented. Moreover, most "software" functions can be performed in special purpose hardware—which has long been considered patentable. The choice of one or the other is relatively arbitrary.

Innovation in software is no less worthy of patent protection than other technologies traditionally protected by patents. CIOs need to be prepared to advise their companies on how to protect their important innovations. And they need to question their vendors closely when purchasing software. A nasty patent suit may force the vendor to divert substantial resources and may even make the product unavailable. A vendor's patent strategy and its risks should be as much a part of the due diligence process as ROI or maintenance fees.

Mark Radcliffe is a partner with Gray, Cary, Ware & Freidenrich in Palo Alto, Calif.

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Chief Change Officer

A CIO helps lead a company back to profitability

BY STEPHANIE OVERBY

Sandra Hofmann is used to playing diverse roles. She spent several years teaching children with learning disabilities before putting in 14 years in management at Big Blue. When not gardening at her rural home, she enjoys target-shooting with her Smith & Wesson 686 revolver. And as CIO of Mapics, a $128 million maker of manufacturing software, she has to understand technology intimately, but she also carries a very different kind of title: Chief People Officer.

Before you snicker at this squishy moniker or feel sorry for Hofmann, hear what she has to say about combining technology and HR leadership in a single executive: "A software company's greatest asset is its intelligence, and that asset resides in people. So HR and IT are really two sides of the same coin."

In fact, Hofmann earned the nickname Chief People Officer around the office before it ever became official. She attributes her appreciation of the effects that IT—particularly IT-driven change—can have on people to her background in education. "Being a CIO represents being a change agent, being a model for others, establishing infrastructure, challenging processes, enabling people to act—doesn't that describe every great teacher you've ever had?" Hofmann says in a gentle but cheerful voice that sounds just like every great teacher you've ever had.

That lesson plan appears to be just what Mapics needed. Hofmann joined the company in July 2000 as vice president and general manager of its Woburn, Mass.-based business unit. But when Mapics stumbled as the recession took hold, President and CEO Dick Cook brought Hofmann down to headquarters in the Atlanta suburb of Alpharetta, Ga., to become CIO of the entire company and help keep the formerly high-flying enterprise aloft. Late last year, Hofmann added the CPO title to her business card. The dual labels reflect her huge role in guiding all of Mapics' 750 employees through several major changes within a short span of time: reorganizing the company, taking a sizable chunk of the workforce completely virtual and introducing offshore outsourcing.

Sandra Hofmann, CIO and chief people officer of Mapics, finds IT and HR to be a natural pair.

That's a lot of change for any organization to digest. Yet at Mapics, Hofmann not only assisted in the transformation but also improved IT service. Her boss credits Hofmann's success to her mastery of many trades. "Sandy has lots of experience working in a wide variety of functions and acting in a lot of different roles," says Cook. "As a result, she's the consummate manager—one who understands the business very well but also has an incredible knack with people."

PHOTO BY STAN KAADY

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Q: What are the most significant digital copier security issues?

A: Various copier print controllers are actually servers that queue and permanently store multiple document files, providing administrator access to the documents. At a minimum, most digital copiers retain the last document processed; some even retain multiple documents totaling hundreds of pages. Others redirect print jobs when the printer is busy or jammed, making "denial of service" attacks possible.

Q: How does Sharp protect the network interface?

A: The Sharp Ethernet card allows administrators to restrict access and disable unnecessary protocols. With this network card, the Sharp digital copier is essentially protected by its own firewall.

Q: How can you be sure that security products actually perform as claimed?

A: The Common Criteria program—administered by the U.S. National Security Agency and the National Institute of Standards and Technology—evaluates security solutions. Products that are validated under the program meet security levels consistent with ISO 15408 methodology.

Q: How can Sharp improve IT security?

A: Sharp offers print privacy solutions designed to restrict unauthorized personnel from seeing confidential materials. Copier access can be controlled and monitored, while documents retained in printer/copier/scanner/fax memory are immediately cleared to eliminate unauthorized access.

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Even so, Hofmann had her work cut out for her. She was part of a three-person team charged not only with completely reorganizing the structure of Mapics but also with modifying the way some employees work and deciding whether others would work at all.

Thinking Without the Box

In late 2001, the reorg team began its work. Whereas everything had previously been centered around product lines—with each line of business having its own IT, HR, finance and other departments—the team consolidated functions. The old structure had worked just fine in the go-go '90s, but the economic downturn had revealed its flaws fast. "We knew [the reorganization] made good business sense and excellent operational sense, but we had to spend a lot of time talking to employees about it," Hofmann says. After countless meetings, surveys and one-on-one conversations, employees began to buy in. "Developers, for example, realized they liked being with other developers where their line managers actually knew what their jobs were," she says.

But the changes were just beginning at Mapics. During reorg planning, executives began to think not only outside the silos that had once existed at the company but also outside its physical premises. "We started saying, 'How big an office do we really need?' and by the end of the day we were saying, 'Why do we need an office at all?'" Hofmann remembers. Closing some offices and sending people home would save $500,000 in real estate costs a year. But even though Mapics was relatively skilled in providing support to telecommuters—every day a third of its employees were on the road or working at home—there always was an actual office to go back to. "There were tons of issues to address, but cost alone demanded that we take a look at it," Hofmann says.

In late 2001, she announced a proposal to take the Massachusetts office virtual, and immediately afterward she began hearing from all sides. "Talk about a dramatic change in people's lives! Some of these people had been coming into this office for 10 years," says Hofmann, chuckling about hearing from as many angry spouses as anxious employees. Hofmann and her staff kept lines of communication open—from setting up FAQs on the intranet to meeting in person for training and orientation—as they began the three-month transition in January 2002.

By March, all 84 Massachusetts-based employees were working at home. Interest in the virtual office program has spread since then. After Mapics' recent acquisition of Columbus, Ohio-based software company Frontstep, several of the newly added employees asked to go virtual, which Hofmann was only too happy to approve. (Despite the success of the program, there are no plans to shutter the headquarters building; centralized services such as IT, finance and HR require a central office, Hofmann says.)

A third big change at Mapics was already under way. Hofmann had begun exploring offshore outsourcing to address fluctuating development staff needs. It was the most controversial and unpopular proposal yet. "Many individuals in development knew outsourcing's checkered past," Hofmann says. "There was a lot of angst concerning what the quality of the work would be and how to manage a process when the team is an ocean away."

Hofmann tried to address such concerns by conducting two pilots with an Indian firm. The tests went well enough that in January 2003, she announced a deal with Indian company HCL Technologies, which took over all development and maintenance. However,

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architecture, design, training, information development and quality assurance work stayed at Mapics. The contract lowered Hofmann's software costs by half.

Yet Mapics still needed to cut more costs. With the outsourcing arrangement in place, the company laid off 12 percent of the software engineering staff. "The world may have gotten used to regular layoffs, but we'd never had to do it. It was very, very, very hard," says Cook.

Turning on the Tech Channel

While the enterprise was working through the trifecta of changes, its IT department wasn't faring as well. "I made the mistake of walking down the halls and listening," Hofmann jokes. What she heard wasn't good. "My organization, which had been pulled together *very* quickly, did not have a service attitude."

In trying to change the mind-set of her staff, Hofmann called on her old teaching skills. "People with learning disabilities are extremely bright, but one of their primary learning channels is not functioning," Hofmann says. "In IT, you have individuals who excel in certain areas but not in others. Programmers, for example, aren't always the most socialized; they're used to being the geeks in the closet. And you may have to capture their attention in different ways." (Careful not to insult her staff, Hofmann adds, "I'm not saying all adults are children. But sometimes it's important to look for the child in an adult.")

So she approached staffers with something familiar to them—data and information. She conducted a companywide survey on the perception of IT and handed the staff the raw results, putting some of her employees face-to-face with complaints that named them directly.

"We got slammed," remembers Jim Overdorff, director of enterprise techni-

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MANAGEMENT REPORTS

The Management Toolkit

Pulling Out All the Stops to Get Restarted

Balanced Scorecard, benchmarking, core competencies—companies' use of these management tools and techniques and many others has boomed since the start of the recession in 2000, according to a survey conducted by consultancy Bain.

On average, companies in the survey—which was mailed to CXOs at companies of all sizes and industries worldwide—used 16 out of 25 tools and techniques in 2002, versus 10 out of the same 25 in 2000. The top three were strategic planning, benchmarking, and mission and vision statements, all used by more than 80 percent of the respondents.

The turn to management tools is driven by a search for profits, says Darrell Rigby, a Bain director who launched the annual "Management Tools and Trends" survey in 1993. "Now that they're squeezed, people are using these methods in search of growth," he says.

The two tools showing the sharpest increases in usage are of particular interest to CIOs: 78 percent of the 708 senior execs responding to the survey said they used CRM in 2002, up from 35 percent in 2000; and 62 percent of respondents applied knowledge management methods in '02, compared with 32 percent in 2000.

The popularity of CRM was the survey's biggest surprise, in Rigby's view. "Some people thought CRM would follow the route of reengineering," he says. But CRM is proving effective at many companies, as indicated by rising satisfaction levels among survey respondents—from well below average in the 2000 survey to just about average in 2002. Rigby attributes this increase to greater sophistication in companies' use of CRM. Rigby notes that many executives use a low-tech definition for CRM rather than automatically equating it with software. "CRM is almost becoming the new vocabulary for a customer-focused strategy," he says.

ILLUSTRATION BY HARRY CAMPBELL

The survey's signals are mixed on knowledge management. KM registered some of the lowest satisfaction rates. "When people are measuring the net benefits, they're saying the benefits aren't as high as they thought they would be, and the costs are 10 times as high," Rigby comments. Even so, the use of KM increased among survey respondents, in line with the general upswing for all methods.

Another survey finding of interest to CIOs: Only 19 percent of the executives agreed with the statement that "We have cut back too far on IT spending." Fully 57 percent disagreed. Is that a call for CIOs to align all IT projects with business needs, or just to rename them as management tools and techniques? *–Edward Prewitt*

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cal services. "A lot of [business] people were nervous about handing stuff over to the IT department because they perceived us as having an attitude." Once the post-layoff staff of 64 saw the problems in black and white, they were more willing to change their conduct, Hofmann says.

Today, Mapics' reorganization is complete. Even more workers are going virtual. Offshore outsourcing is in full swing. And after two years of losses exceeding $20 million, the company returned to the black in 2002, with profits of $14 million on $128 million in revenue.

The IT department doesn't get that much attention from its users now—which is a good thing. "It's like the electric company. When you flip the switch, you expect the lights to go on, and you hardly think about it. However, if the lights don't go on, you're not too happy," Cook says. "IT service is the same. A year ago, it didn't always work. Today it works."

> **"People with learning disabilities are extremely bright, but one of their primary learning channels is not functioning. In IT, you have individuals who excel in certain areas but not in others. And you may have to capture their attention in different ways."**
>
> –Mapics CIO and Chief People Officer Sandra Hofmann

Could your organization cope with changes as drastic as those at Mapics? E-mail your thoughts to *hotseat@cio.com*. Senior Writer Stephanie Overby *(soverby@cio.com)* covers outsourcing.

Leadership Agenda BY SUSAN H. CRAMM

A Cry for Full-Cycle Governance

It's the only way to ensure project success

MIT's Peter Weill says that "an effective IT governance structure is the single most important predictor of getting value from IT" (from his paper "Don't Just Lead, Govern: Implementing Effective IT Governance," coauthored with Richard Woodham). If that's true, how do we explain the fact that many organizations have not set up governance in a way that promotes value?

That question was recently posed to me by one of my clients. Even though she is responsible for her company's current governance structure, she sees it for what it really is: nothing more than a well-run project approval process, with ROI calculations, business sponsor testimonials and meetings attended by all the usual suspects. At no time has the governing body revisited an approved project in light of new information (also known as change requests), terminated a project or assessed the company's track record for value realization. Sound familiar?

Let's be honest. At many companies, governance should be called "govern-once." Although there is broad agreement about what governance should be—"the decision rights and accountability framework to encourage the desirable behavior in the use of IT," as Weill puts it—in reality what passes for governance is often a one-dimensional, checklist-based and attendance-based effort focused solely on project prioritization and approval.

In *The Information Paradox*, John Thorp writes about full-cycle governance. CIOs must ask themselves four "ares" to reach this ideal state:

1. Are we doing the right things?
2. Are we doing them the right way?
3. Are we getting them done well?
4. Are we getting the benefits?

If you think about these four questions, you can easily see that many companies focus their efforts on the first but never address the other three concerns.

Since most competent IT executives understand what governance should be, it is safe to assume that they have good reasons for not pushing harder for full-cycle governance. In my view, they don't believe the effort is justified.

Without question, it's hard work implementing full-cycle governance. Many organizations have immature investment disciplines typified by a "if we build it, the value will come" approach. They will not devote the effort necessary to establish measurement systems that will sustain a focus on projects for years after they have been theoretically implemented. In addition, since the majority of CEOs believes that CIOs should be held accountable for realizing value from IT investments, it takes a lot of rewiring to get the accountability shifted to where it needs to be: the business leaders who own the three P's of value realization—people, processes and P&L. Finally, a lot of IT types don't believe that value targeting and monitoring is practical (for example, proponents of the "ROI is dead" position).

What's more, from a payoff perspective, the link between full-cycle governance and CIO success is hard to see. CIOs understand that as long as they ensure that the right projects are selected and successfully delivered, they will not only survive but thrive. The effort required to achieve full-cycle governance is just too much for most CIOs. As a result, they limit their project management to govern-once. These CIOs believe they can make most any project succeed as long as they have enough business sponsors, subject matter expertise and money.

That belief is wrong. Business sponsorship is a weak substitute for leadership. Many CIOs don't understand that full-cycle governance is an industrial-strength method of improving the success of IT projects. By driving project success, IT value becomes more than a projection—it becomes reality.

It does so by transforming a business project sponsor into a business project leader. Using a parenting analogy, full-cycle governance forces business leaders to raise the project as one of their own rather than send it to the IT boarding school. This increased accountability motivates business leaders to assign their top talent, establish baseline measurement systems, manage risks and manage project scope, and see changes through. Full-cycle governance induces business leaders to cascade project accountability throughout their organizations rather than leaving accountability to the CIOs.

It's time for CIOs to reassess full-cycle governance. The govern-once mechanisms in place at most companies are only a first step in realizing value from IT-enabled business investments.

Reader Q&A

Susan H. Cramm answers questions on "A Cry for Full-Cycle Governance"

Q: In your example, the project review process is typically performed once. My experience is that changes in excess of a certain monetary or value threshold require that a project be reevaluated. The review process is both time-consuming and expensive.

A: You bring up an important point: Successful governance mechanisms depend on ensuring that the initial and subsequent project evaluations and decisions are performed quickly. Review processes can be expedited if the executive investment management board: 1. understands how much it can spend and what return the project should generate; 2. is able to convene virtually to make critical decisions quickly; 3. is supported by an independent group of value analysts who ensure quality submissions; and 4. delegates responsibility for decisions that are below certain risk thresholds.

Q: We have taken the first step in implementing governance councils with relative success. However, we struggle with keeping project updates focused on pertinent issues.

A: Great councils rely on good staff work. Good staff—in the value management world—will focus the council on the decisions it needs to make by presenting the relevant information in a succinct format. The value management analysts should be independent of the IT organization—most likely staffed from the finance function.

Q: What is the best way to codify the life cycle of corporate governance?

A: The first step is getting the CEO and COO to make it clear that business executives are accountable for value realization. The second step is showing that value monitoring can be made practical and consistent with the company culture. Partner with the CFO and find a receptive general manager and a project that can be used as a test case. After a few iterations of this process, the company commitment will have solidified, and the requirements for a codifying tool will be understood.

Q: How can we get answers to John Thorp's questions? For example, how do we benchmark IT change control? We have already checked ITeL [the IEEE Information Technology Library], some consulting companies and our peer organizations.

A: Don't start from scratch, but do remember to start your education process at the top of your organization. Don't benchmark with peer organizations; benchmark with companies that are more mature in their IT practices. Look for organizations in industries or segments that have a higher level of information intensity. For example, if you are in retail, visit distribution companies. If you are in brick-and-mortar manufacturing, visit online manufacturers. If you are in health care, visit insurance companies. If you are in insurance, visit banking.

To see more reader questions and answers from Susan H. Cramm, go to *www.cio.com/leadership/agenda.html*. Cramm is president of Valuedance, an executive coaching firm based in San Clemente, Calif. Her e-mail address is *scramm@cox.net*.

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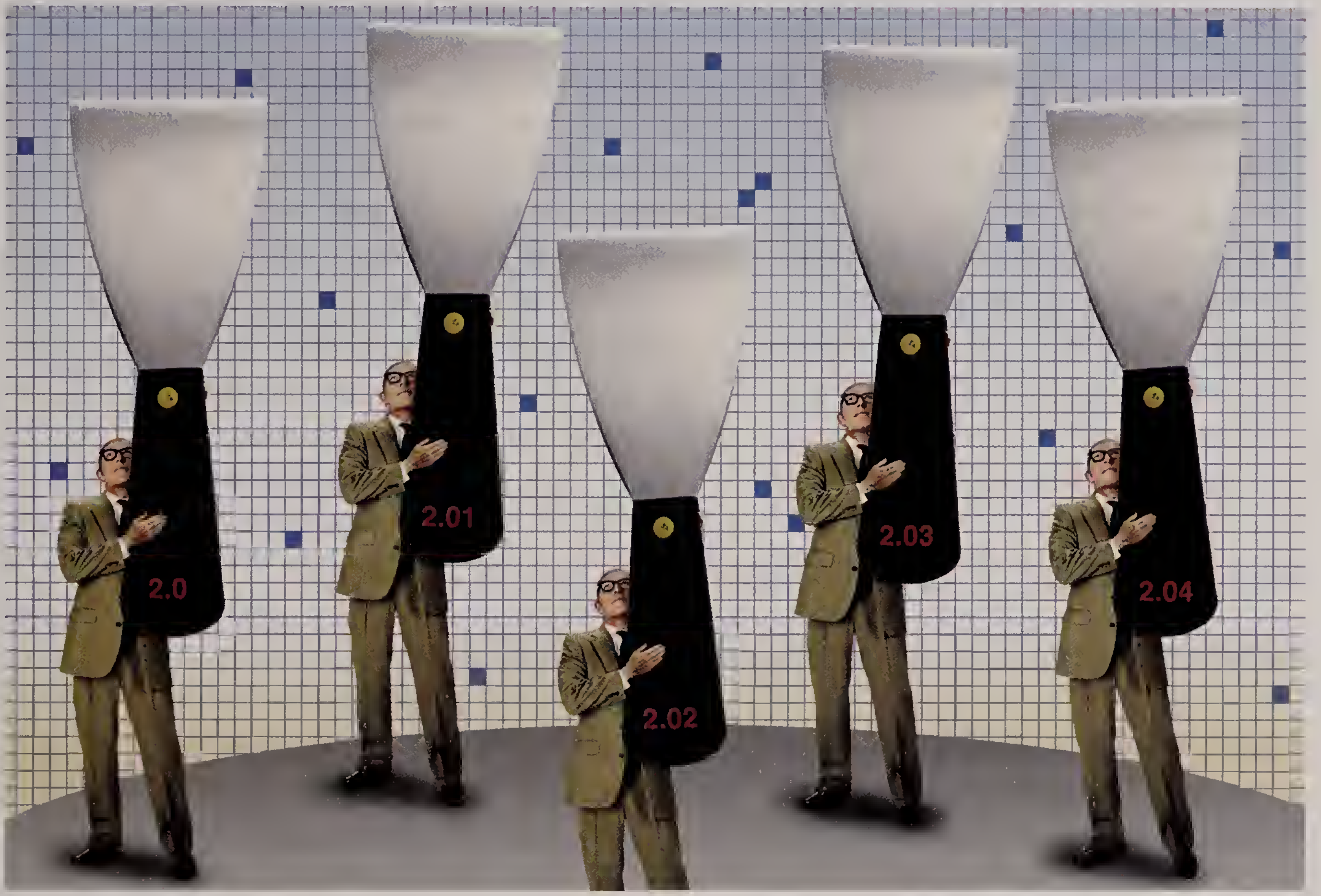

Patching Things Up

The latest patch management tools can help reduce costs and increase reliability BY BOB VIOLINO

UNTIL RECENTLY, patch management was something most technology managers didn't think much about. Security holes and bugs appeared; vendors released patches to repair them—and that was that. But software companies now release thousands of patches every year, and CIOs are running into potentially costly problems because they don't have an efficient, automated way to manage and deploy these fixes.

To combat the problem, many companies are coming to rely on products that automate the process. The general consensus among IT man-

Edited by Christopher Lindquist. Read his column "Tech Tact: New Tools for New Jobs" every Monday at www.cio.com. *Send suggestions for future columns and features to* clindquist@cio.com.

ILLUSTRATIONS BY LOU BEACH

Patch management...Long-range monitoring...High-end storage agers who use these patch management tools is that they are well worth the investment—saving time, labor and money. But be warned: Patch management alone won't provide a complete solution. Organizations need to combine automation with an effort to rein in the out-of-control computing environments that helped make patch deployment so complex in the first place, say IT managers and analysts.

Patch Wars

Patch deployments are often major endeavors, requiring companies to devote thousands of man-hours to manual fixes. Deploy the wrong patches, or fail to patch the right machines, and the resulting vulnerabilities can become major problems. (The SQL Slammer worm, for instance, took advantage of a flaw in Microsoft's software that already had a patch.) A survey last year by Aberdeen Group showed that companies and government agencies worldwide are spending in excess of $2 billion annually to deal with patches. And Digex, a provider of managed Web and application hosting services, calculates the annual cost of manually managing patch deployment to be about $14,400 per server.

"[That cost is] extraordinary, and that's just at the Microsoft level; other vendors have vulnerabilities as well," says Bobby Patrick, vice president of strategy at Digex. "It's war out there to manage patches." And the situation is getting worse as companies get inundated with patch releases. (CERT, for example, reported 4,129 security vulnerabilities in 2002, nearly twice as many as in the previous year.)

"It's like drinking from a fire hose," says Eric Hemmendinger, a research director at Aberdeen. Even when a company devotes people to patch deployments, "a lot of time has to be spent on this if you want to be diligent about it," he notes.

Patches are generally issued "in a way that's convenient for the supplier but not necessarily for the user," Hemmendinger adds. "Supplier assessments as to whether patches are critical are judgments rendered in a vacuum; vendors don't know what the customer is doing with their product."

Automation Opportunity

Some analysts say companies shouldn't even consider applying patches manually. "It's impossible. If you think about a company with thousands of desktops and hundreds of servers, manual processes don't scale," says Gartner Research Director Mark Nicolett. "For each system, you have to look at what software is installed and understand which patches apply to that machine. It takes lots of analysis to figure out which one goes on which machine."

Patch management tools look for and analyze new patches, scan devices on networks to find vulnerabilities, and deploy the correct patches. Some products also test the patches to verify that they work. But automated systems aren't a cure-all. Truck manufacturer Paccar has been using several patch management tools "with varying degrees of success," says Vice President and CIO Patrick Flynn.

Paccar has used products from McAfee Security, Microsoft and On Technology to automatically deploy patches to PCs and servers, Flynn says, cutting the time it takes for deployments and improving their accuracy. "We don't have to send an army of people out there [to deploy patches]. From a labor perspective, the return on investment has to be pushing 100 percent," he says. "But there's still a long way to go before we get to where we need to be" because the tools don't ensure that all of the company's more than 12,000 PCs and servers are getting the correct patches when they need them.

Be warned: Patch management alone won't provide a complete solution.

Patch Tools

Anticipated benefits Reduced downtime because of software failures; mitigated risk of attack from hackers; and lower costs than manually applying patches.

Hurdle No one-size-fits-all patch management tool available yet, which requires customers to purchase more than one product to cover all systems and software.

Cost Varies by application and environment; $8.50 to $100 per workstation per year and $20 to $2,500 per server per year, depending on product and configuration.

Vendors

BigFix *www.bigfix.com*
BigFix Patch Manager 3.0

Configuresoft
www.configuresoft.com
ECM Security Update Manager

Ecora *www.ecora.com*
Ecora Patch Manager

LANDesk Group
www.landesk.com
LANDesk Management Suite

Kintana *www.kintana.com*
Kintana Change Manager

Microsoft *www.microsoft.com*
Software Update Services

Novadigm
www.novadigm.com
Radia Patch Manager

On Technology
www.on.com
On iCommand

PatchLink *www.patchlink.com*
PatchLink Update

Shavlik Technologies
www.shavlik.com
HFNetChkPro

St. Bernard Software
www.stbernard.com
UpdateExpert

"If your success rate is 90 percent, you still have 1,000 devices to find and update," Flynn says. "There isn't really an integrated one-size-fits-all tool for patch management. If you're a global IT organization, you need a variety of tools to deploy patches for security, operating systems, browsers, applications. And patches have to be applied to servers, desktops and PDAs. How do we manage all that software? It's one of the biggest problems facing our industry."

Digex calculates the annual cost of manually managing patch deployment to be about $14,400 per server.

The management tools have been fairly easy to set up, Flynn says, but there can be some complexity when integrating patch tools with existing software. He says companies should have someone dedicated to overseeing patch management software to ensure it's being used most efficiently.

A Hard Patch

Paccar's experience is mirrored by others. After the Slammer attack illustrated companies' vulnerabilities, RBC Centura Banks issued a corporate mandate to bring all its production servers up to date on required patches. "We checked into doing it manually and knew we had a sizable task in front of us," says James Williams, manager of information delivery.

Managers estimated it would take more than 12,000 man-hours to complete the task, including deploying and testing patches on more than 220 servers. RBC opted instead to use Ecora's PatchMeister to deploy patches, and the process took about 2,000 hours in just over a month. Williams says there was still manual work involved, when technicians had to tweak some of the patch deployments for particular servers. But the automation software did provide time and labor savings, Williams says. "It helped us to quickly identify the status of the servers and told us which patches we needed to apply in our NT and Windows 2000 environment." The bank uses the software to evaluate and deploy anywhere from two to 15 patches per month.

RKA Petroleum faced the problem of the faulty patch. The petroleum products wholesaler had been struggling for months to keep current with the constant release of patches from Microsoft and other vendors. Things came to a head earlier this year when a critical server crashed because it was using the wrong software patch; IT staffers spent 15 hours on the phone with Microsoft reps trying to figure out which patch to deploy. Ultimately they ended up rebuilding the server.

"The problem was Microsoft assigned a patch that was not needed for the machine. There wasn't enough disk space for the patch, and it started deleting files. Services started to fail, and people couldn't log on to our network," says IS Manager Jason Hittleman.

Soon after the incident, RKA bought a patch management product called Update from PatchLink, Hittleman says. RKA now uses the software to automatically deploy patches to its PCs and servers after approval by a human administrator.

The problem could have been avoided if the software had been in place to deploy the correct patch, Hittleman says. "It knows exactly what's on each machine," so there's less chance for errors in deployment, he says. "Before this problem, we had put all our trust in Microsoft. Whenever they recommended a patch, we wouldn't think twice about it. This opened our eyes to the issue." He says the sub-$2,000 software has already paid for itself in reduced labor costs.

Vendors to the Rescue?

Some companies are trying to get software vendors to help ease patch management. Qualcomm, for instance, is using five different patch management vendors for various platforms, including Kintana (which was purchased by Mercury Interactive) for patches on Oracle applications.

"We are working with Oracle to [try to] simplify the patching process," says Tom Fisher, vice president of IT for Qualcomm's CDMA technologies division. "There are a lot of patches required in their product set because of the [sheer volume] of applications. We're pushing Oracle to simplify the patching process and either help us provide a better patch solution or adopt [technology from a vendor] like Kintana as a standard."

Fisher considers logs that track how well patches are distributed to be a critical feature. "Give me a log that tells me [the status of a patch distribution], so I know that it only happened on this machine, and I don't have to worry about the 18 other machines I pushed to today. Logs are critical. I want to know how many [patches] failed. Why did they fail?"

Fisher says it's difficult to know which of the many patch management products are best. "We have Solaris, HP-UX and Linux, and we're trying to figure out a solution that will cover all three," he says. "Typically we've found we'd have to write [such a solution]. I'd love to be able to use one tool, but I know that applications are different from firmware, which is different from operating systems."

Even with automated patch management, analysts say, the process can still be complex. "If a company has an unstructured environment with a large combination of software products on PCs and servers, it's not in a good position—no

Peer Resources

The August issue of **CSO Magazine** features a definitive account of the inherently flawed world of **SOFTWARE PATCHING** and how it's breaking down. Read "Can't Patch This" at **www.csoonline.com**.

matter what patch management tool it's using," says Gartner's Nicolett.

"Patch management software is helpful in that you at least have a vehicle for delivering a high volume of patches automatically. But if you have five configurations of Windows and 500 flavors of production systems, it's still very difficult to deploy patches," says Laura Koetzle, a senior analyst at Forrester Research. "Having too many configurations of Windows is a huge problem."

Koetzle suggests enterprises select three or four standard configurations—for example, a Web server, an application server and a back office—and standardize on those. "This ensures that eventually you will have a standard pool of Windows configurations that you can more easily test patches against," she says.

Paccar's Flynn agrees that computing environments are getting too complex. "For the last several years, we've worked to get control of our computing environment," he says. "The more you add things, the more difficult it becomes." For that reason, Paccar has begun to restrict company PC specifications and software packages, and restricts who can modify settings.

Meanwhile, software vendors (see "Patch Tools," Page 80) are lining up to provide patch management tools. Microsoft is attempting to improve its own patch solutions. In June, the company launched a redesigned patch management tool and announced it would make continued improvements to its system for issuing security patches for its products. Microsoft later this year will consolidate the ways it distributes patches to customers, to simplify the process.

Will such efforts decrease the need for patch management tools? Not likely. "The tools vendors will always be able to provide some additional value on top of what Microsoft is doing," says Koetzle. ■

Bob Violino is a freelance writer based in New York City.

UNPLUGGED
Wireless monitoring

Remotely Possible

CHECKING THE VITAL STATISTICS of an oil well calmly pumping away in the middle of a dusty nowhere is a time-consuming, tedious, expensive—and completely necessary—job. High-end wells can produce hundreds of gallons of oil per day, and failing equipment could result in significant bottom-line damage if the flaws aren't promptly detected.

To fulfill the oil companies' desire to keep an efficient eye on the daily lives of their equipment, Luna iMonitoring (*www.lunaimonitoring.com*) is developing technology intended to let customers remotely track critical measurements, such as pressure, tank levels and natural gas flows. The iMonitoring systems combine multiple components—including a solar cell, battery pack, computer processor, data radio and sensors—into compact, relatively low-cost packages that can be quickly and easily attached to pump equipment. These packages then transmit via a proprietary radio protocol to a concentration and communications unit that uploads the data via satellite to the oil company's waiting computers for analysis.

The goal, says CEO Kenneth Ferris, is to "drive down the cost factor" of such monitoring equipment by a factor of four or five, allowing pump operators to make an economically feasible argument for putting the gear on less productive wells. Typical solutions available today tend to cost between $10,000 and $15,000, Ferris says. The iMonitoring tools currently being beta tested will cost in the $3,000 range, with a second generation available in two years that would cost about half that.

Ferris sees the technology moving beyond the energy industry. He notes that, if available cheaply enough, the tools could appeal to the wastewater and agriculture industries, as well as for general industrial automation. For instance, Luna has developed a vibration sensor that can detect when bearings in pumps, compressors or turbines start to fail.

Luna iMonitoring is still in the R&D stage, according to Ferris. But he expects products to ship in the fourth quarter of this year.

–Christopher Lindquist

COMPANY TO WATCH
BlueArc

BlueArc Branches Out

High-performance storage company seeks some room on the lower end BY MERIDITH LEVINSON

IN 1998, Geoff Barrall was in London designing data centers as a consultant for customers including General Motors and BMW when he discovered the idea for his next business. One of Barrall's customers was experiencing bottlenecks on its servers, which couldn't keep up with the speed of the company's new gigabit Ethernet network. Barrall set out to find a server that could keep pace. When he concluded his search empty-handed, he came up with the idea for BlueArc, the company for which he is now executive vice president and CTO.

Today, BlueArc makes high-end network attached servers (NAS) that are known for their performance and scalability. While the venture-funded company may have just 1.4 percent of the total NAS market, Gartner ranks it number three behind behemoths EMC and Network Appliance in the NAS market's high-end segment. "The market we classify as NAS is fast growing with a 16.7 percent [compound annual growth rate]," says Gartner analyst Roger Cox. "That's the highest growth rate in the storage market. By 2007, it will be $3 billion in size."

Turning Software into Hardware

BlueArc has so far been able to compete with the big boys mainly by virtue of its unique, hardware-based architecture. Instead of building a server that relies on specialized software for managing its load, BlueArc bases its servers on custom-designed integrated circuits dedicated to simultaneously performing typical server tasks such as networking, file system and server management. Barrall says the migration of software into hardware and the parallel processing make the server run faster and more efficiently. Indeed, Vijay Agarwala, director of GeARS, Penn State University's high-performance computing center, replaced three of his existing file servers with a single Si7500 file server from BlueArc.

In an effort to further differentiate itself from competitors and to respond to customers' price fixation, the company released a new product last April called the BlueArc SiliconServer. It lets companies deploy different kinds of storage—such as high-speed, high-performance fibre channel and lower speed ATA—in the same NAS system. Using this multitiered approach to storage, customers can decide which applications should run on higher performance disks and which can run on lower performance—and lower cost—hardware. "In a competing system, everything has to be stored either all in fibre or all ATA," says Gartner's Cox. He adds that mixing different types of storage on the same platform allows the CIO to configure a storage system that gives his company the best price-performance ratio.

"[BlueArc's multitiered approach] is going to allow companies to reduce their initial capital outlay for robust enterprise quality storage, and it's going to allow them to reduce their total cost of ownership over time," says Cox. And BlueArc's products are so scalable (they can deploy with as much as 200 terabytes of storage compared with competitors' 2 to 6 terabytes), companies don't need to deploy as many units. "The fewer the number of units, the less costly it is to manage," adds Cox.

BlueArc

Headquarters San Jose, Calif.
Founded 1998
Employees 200
Products SiliconServer multitiered storage
Reason to watch Its unique hardware-based architecture makes file servers run faster and more efficiently. New product lets companies lower their costs by matching different kinds of storage with different applications, all in the same storage system.
Hurdles to clear Lack of market presence. Strong competitors.
Web link www.bluearc.com

An Uphill Battle

Mark Chandler, director of information systems at drug discovery company NeoGenesis Pharmaceuticals, concurs with Cox. "Backing up one large disk as opposed to many servers makes life so much simpler," he says. Chandler also likes BlueArc's competitive prices, which made him decide to stop purchasing from EMC. Barrall says BlueArc's products start at $40,000 and average between $100,000 and $200,000. Chandler also selected BlueArc over the competition because its servers are compatible with the two platforms his company runs, Windows and Linux.

In spite of BlueArc's advantages (strong engineering and R&D, solid technology, good customer service and happy customers), the company still faces an uphill battle for survival. Cox notes that to break even, BlueArc is going to have to double its 2002 revenue of $19 million. And to do that, he says, the company needs to increase its visibility and credibility by partnering with resellers that focus on vertical markets, which would open another distribution channel. CIO

Senior Writer Meridith Levinson can be reached at *mlevinson@cio.com*.

CIO 100
SYMPOSIUM AND AWARDS CEREMONY

Sunday

8:00 AM–1:30 PM
Golf Tournament

2:00 PM–7:30 PM
Registration

4:15 PM–5:30 PM
***CIO* Executive Mindshare Meetings**
Small working groups explore the leadership challenges and best practices of specific, critical IT/business topics.

1 Managing the risks of outsourcing—including offshore

2 IT cost control & flexibility

3 Leveraging IT employees: bringing their full potential—and hanging on to them

4 The CSO in you: how to be your own security watchdog

5 Long-term partnerships: negotiating strong, mutually beneficial vendor deals

6 Dealing with consolidation in the tech industry

7 Ensuring data privacy in an access-hungry environment

5:30 PM–7:30 PM
Café 100: Welcome Reception & Golf Tournament Awards

7:30 PM–9:30 PM
NetIQ's Swingin' Speakeasy

Monday

7:00AM–8:00 AM
Registration and Breakfast

8:00 AM–8:15 AM
Conference Welcome
ABBIE LUNDBERG
Editor in Chief, CIO Magazine

8:15 AM–9:00 AM
Opening Keynote
PAUL SAFFO, *Conference Moderator*
Director and Roy Amara Fellow, Institute for the Future
Saffo talks about why he thinks we are poised on the verge of an onslaught of technological innovation that will affect every corner of business and society in the decades ahead—even though at first glance, this coming wave seems to defy anticipation, much less meaningful assessment of its likely impacts.

9:00 AM–10:00 AM
Creating a Cutting-Edge Culture
Moderator: **RICK SWANBORG**, *President,* ICEX
Panelists:
RIZWAN AHMED, *CIO,* Louisiana Office of Group Benefits
ROBERT DUTILE, *Group Manager & Executive Vice President, Enterprise Architecture Group,* KeyCorp.
JAN FRANKLIN, *CIO & Vice President,* Farmers Insurance Group
ED WOJCIECHOWSKI, *CIO,* Menasha Corporation
In today's current competitive environment, innovation and resourcefulness are more important—and more challenging—than ever. This panel of CIO 100 winners describes how they've managed to be simultaneously resourceful and forward-thinking, creating an enterprise-wide mindset of innovation even in the toughest of times.

10:00 AM–10:30 AM
Innovation, Leadership & Resourcefulness
CRAIG CONWAY, *CEO,* Peoplesoft

11:00 AM–11:45 AM
Industry Briefings
Our corporate partners present case studies and sessions on deploying the latest technologies and services.

11:55 AM–12:25 PM
Getting Fast and Flexible
JEFF COHEN, *CIO,* JetBlue Airways
One of our CIO 100 winners shares how they developed faster, more flexible processes inside and outside the company despite restrictions on their resources.

12:35 PM–1:35 PM
Networking Luncheon

1:45 PM–2:10 PM
Creating New Methods of Demonstrating Value
DOUGLAS F. BUSCH, *Executive Vice President & CIO,* Intel Corporation
In tough times, we're under more pressure to demonstrate the value of every IT dollar. But if traditional metrics for determining and demonstrating ROI don't work in your case—create new ones. This winner did.

2:10 PM – 2:35 PM
Creating New Tools to Prioritize IT Initiatives
ROBERT WEIR, *Vice President of IS,* Northeastern University
Universities always operate under financial constraints and have notoriously vocal department heads. How do you develop a method to really evaluate and prioritize all IT initiatives that everyone buys into—and that works?

2:45 PM–4:20 PM
Industry Briefings

4:30 PM–5:30 PM
Motivating Employees and Boosting Morale
Moderator: **MARTHA HELLER**, *Director, CIO* Best Practice Exchange & *CIO* Select
Panelists:
STEVEN W. AGNOLI, *CIO,* Kirkpatrick & Lockhart LLP
MARY FONDER, *CIO,* Maysteel LLC
J. A. GOTTRON II, *Executive Vice President & CIO,* The Huntington National Bank
When the economy enters a downward spiral, so does morale—and that can cause productivity and sales to hit the skids as well. We bring together a group of CIO 100 winners to share a diverse collection of initiatives.

5:30 PM–7:00 PM
Café 100 Reception

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Our award-winning CIOs share ideas
you can use today, as they tell us

What Works Now

Some of our favorite thought-leaders
look into the future, and predict

What Lies Ahead

Tuesday

7:00 AM–8:00 AM
Breakfast and Informal Roundtable Discussions
Gather with *CIO* magazine editors and fellow attendees to discuss common problems and possible solutions.

8:00 AM–8:15 AM
Welcome
PAUL SAFFO
Conference Moderator

8:15 AM–9:15 AM
Leading in an Age of Extraordinary Challenge
Moderator: **ABBIE LUNDBERG**, *Editor in Chief,* CIO Magazine
Panelists:
STEPHEN N. DAVID, *CIO & Business-to-Business Officer*, Procter & Gamble
TOM MURPHY, *CIO*, Royal Caribbean Cruise Lines
ANDRE SPATZ, *CIO*, UNICEF
BETTE WALKER, *CIO & Vice President*, Delphi Corporation

Lundberg hosts a panel of award-winning CIOs. They discuss our current state of evolution, where we're heading and the requirements of the IT leadership role, including shifting accountability, governance and organization models.

9:15 AM–10:00 AM
Leadership: Partnering In Action
Most businesses are only as strong as their executive teams, making the relationship between the "O's" more critical than ever during difficult times.

10:30 AM–11:15 AM
Industry Briefings

11:25 AM–12:15 PM
Smart Mobs—Mobile Communications, Pervasive Computing, and Collective Action
HOWARD RHEINGOLD
Author, Journalist, Futurist and Guru of Digital Culture
Smart mobs display the ultimate resourcefulness. They harness the combination of mobile communication, the Internet and pervasive computing to enable people to cooperate in ways never before possible. Rheingold takes a hard look at the driving forces, critical uncertainties, opportunities and threats posed by smart mob devices and practices.

12:30 PM–2:00 PM
Networking Luncheon

2:00 PM–2:30 PM
What You Need to Know About Sarbanes-Oxley
MICHAEL CARPENTER, *Partner*, KPMG
At our April *CIO Perspectives* conference, several CIOs from large, well-known organizations were surprised to find out what they really needed to know about complying with Sarbanes-Oxley, and about how large their role should be. We asked Michael Carpenter to help give everyone a "head's up" on what we feel is an important issue for CIOs.

2:40 PM–3:25 PM
Industry Briefings

3:40 PM–4:40 PM
Looking Ahead—IT Reinterpreted
W. BRIAN ARTHUR
Citibank Professor, Santa Fe Institute
Arthur shares his views on how IT is being reinterpreted by old, traditional industries—resulting in completely new sub-industries such as genomics, proteomics, financial engineering, smart pharmaceuticals, nanotechnology, and the like. They are being born out of IT, and will change our lives and our businesses.

4:40 PM–5:00 PM
Conversations—Going Forward
Paul Saffo, W. Brian Arthur, Howard Rheingold and Friends
Over the past two days, several of our CIO 100 award winners have shared "what works now," and our industry gurus have provided their views about "what lies ahead." We come together to talk about what it means for us personally, for CIOs professionally, and for our organizations going forward.

5:00 PM–5:15 PM
Final Comments
PAUL SAFFO

CIO 100 Awards Ceremony
6:15 PM – 11:00 PM

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- ★ **CIO 100 Awards Dinner & Ceremony**
- ★ **Dessert Reception**
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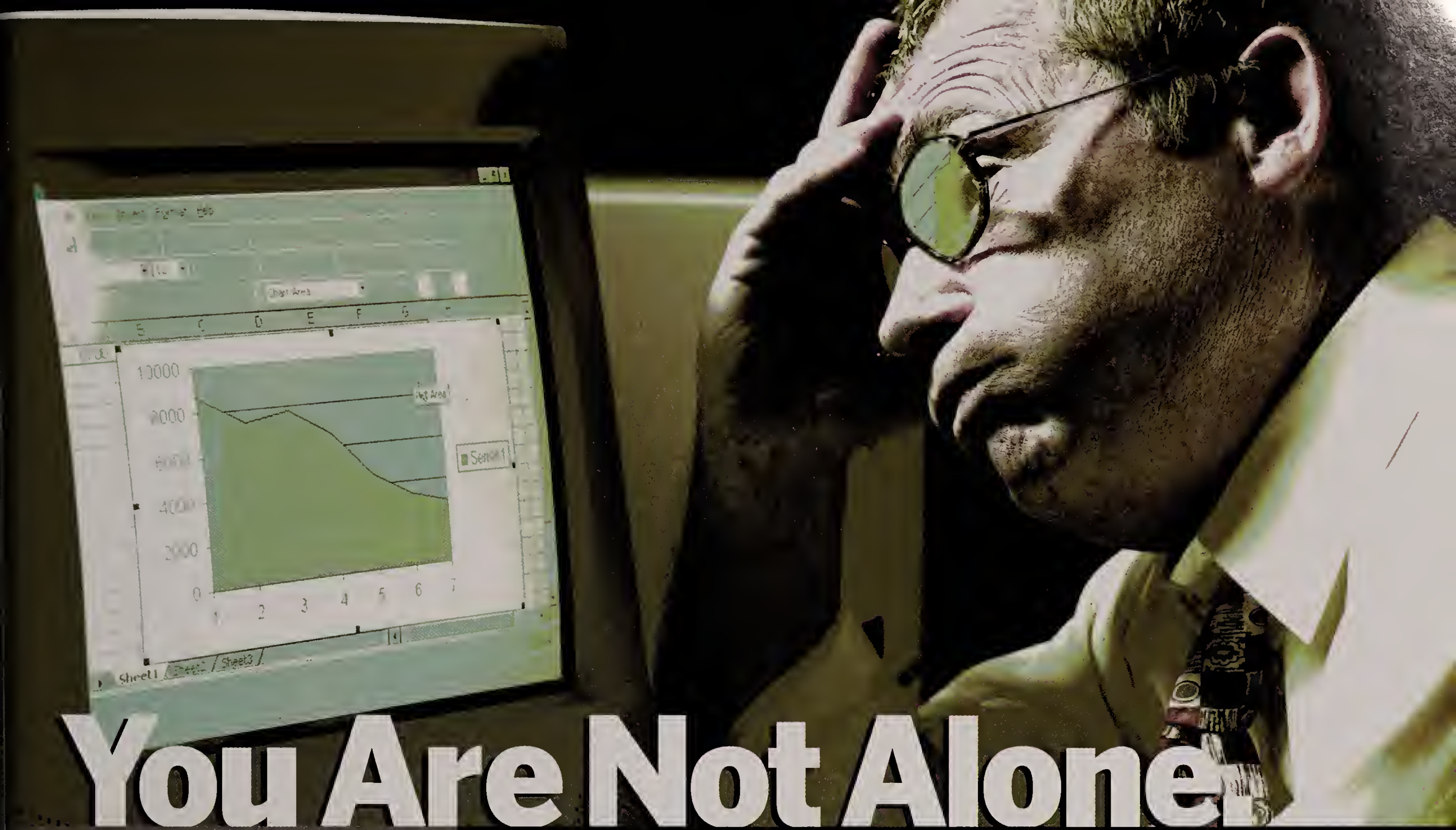
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EXECUTIVE Summaries

August 1, 2003

COVER STORY
Executive Stress

By Christopher Koch | 40

Fifty-two percent of today's executives will die of diseases related to stress, according to Connie Tyne, executive director of the Cooper Wellness Program. Constant stress does more than damage your health. It destroys your judgment and distorts your decision-making processes by shrinking a part of the brain that controls memory and concentration. In cavemen, three major psychological factors made stress hormones flow: lack of control, fear and isolation. Today's CIO role is tailor-made for feeling out of control. Infrastructures can crash at any moment, CEOs can change their minds and stop funding projects, or businesspeople can resist using your beautiful new system for no good reason. You have a vast amount of responsibility but little authority for controlling outcomes. This is what psychologists call low decision latitude. The best antidote for stress is exercise. Try to control what you can, and shift accountability for things you can't control to those who can. Taking breaks during the day can turn off the fight-or-flight response, at least temporarily. Shut the door for five minutes and take a few deep breaths. Visualize something nice, like a vacation. Another stress mitigation technique is to build a support network outside work that you can talk to about what you're experiencing.

> **"You need for your staff to know that you're human; you don't need your staff to know that you're weak."**
>
> –JIM QUICK, PROFESSOR OF ORGANIZATIONAL BEHAVIOR, UNIVERSITY OF TEXAS AT ARLINGTON

Electronic Medical Records

By Sarah D. Scalet | 52

AT MAIMONIDES MEDICAL CENTER—a 705-bed hospital in Brooklyn, N.Y.—revenue increased $50 million last year, thanks in part to the hospital's implementation of electronic medical records and computerized physician order-entry systems that enable physicians to order medications and tests, check lab results, and track treatment online. Such sophisticated systems could save $2 billion a year in hospitalization costs. Yet, at present, Maimonides is among only 5 percent of U.S. hospitals that have implemented order-entry and error checking capabilities systems because of the up-front costs and resistance from physicians. CIOs must drive this transformation, delivering systems without incurring potentially deadly downtime or allowing medical files to fall into the wrong hands. To win over resistors, CIOs should consider one-on-one training for physicians rather than classroom instruction. They should also try to deliver early value—once physicians get something out of the system, such as faster lab-test results, they'll be more likely to accept further changes.

Wireless Hospitals

By Galen Gruman | 60

WIRELESS SYSTEMS, especially those based on the 802.11b standard (also known as Wi-Fi), are becoming more widely deployed in hospitals today—where patients and medical staff are constantly moving and it's difficult for staff members to take a break to enter patient data and test results or to order tests and medications. This new conduit lets staff access and update records and make orders at the point of care. That reduces transcription-related errors and delays, and fits into doctors' and nurses' workflow. The systems have proven relatively inexpensive to deploy, costing a few percent of the overall outlay for a facilitywide electronic medical records system. Several early adopter hospitals share lessons learned in securing the sensitive patient data, dealing with network performance problems such as delays between access points and dropped connections, and supporting multiple types of wireless access devices.

The Software Patent Problem

By Lawrence Rosen and Mark Radcliffe | 66

IS THE SOFTWARE PATENT SYSTEM harmful to innovation? Critics accuse big software companies of creating portfolios of thousands of patents designed to legally monopolize innovation and use as a bargaining chip with competitors. Under this broken system, CIOs are increasingly at risk of infringement. Others say it's the U.S. Patent and Trade Office that simply needs to be more careful in judging what is appropriate to patent. Concerned CIOs should lobby for more thorough examination of patent applications or request that an already established patent be reexamined. In any case, since a patent suit can divert substantial resources of the vendor and may even make the product unavailable, a vendor's patent strategy should be as much a part of your due diligence process as ROI or maintenance fees.

Emerging Technology: Patch Management

By Bob Violino | 79

ABERDEEN GROUP ESTIMATES that companies and government agencies spend more than $2 billion a year to handle the thousands of patches issued by software vendors. Until recently, when security vulnerabilities, viruses and other problems appeared, vendors released patches—and that was that. A maturing class of patch-management tools promises to automate the process of distributing patches while making sure that machines get only the updates they need. But no tool yet works across all operating environments, and companies may need to reduce the number of configurations they maintain to get a complete handle on patch management for their enterprises.

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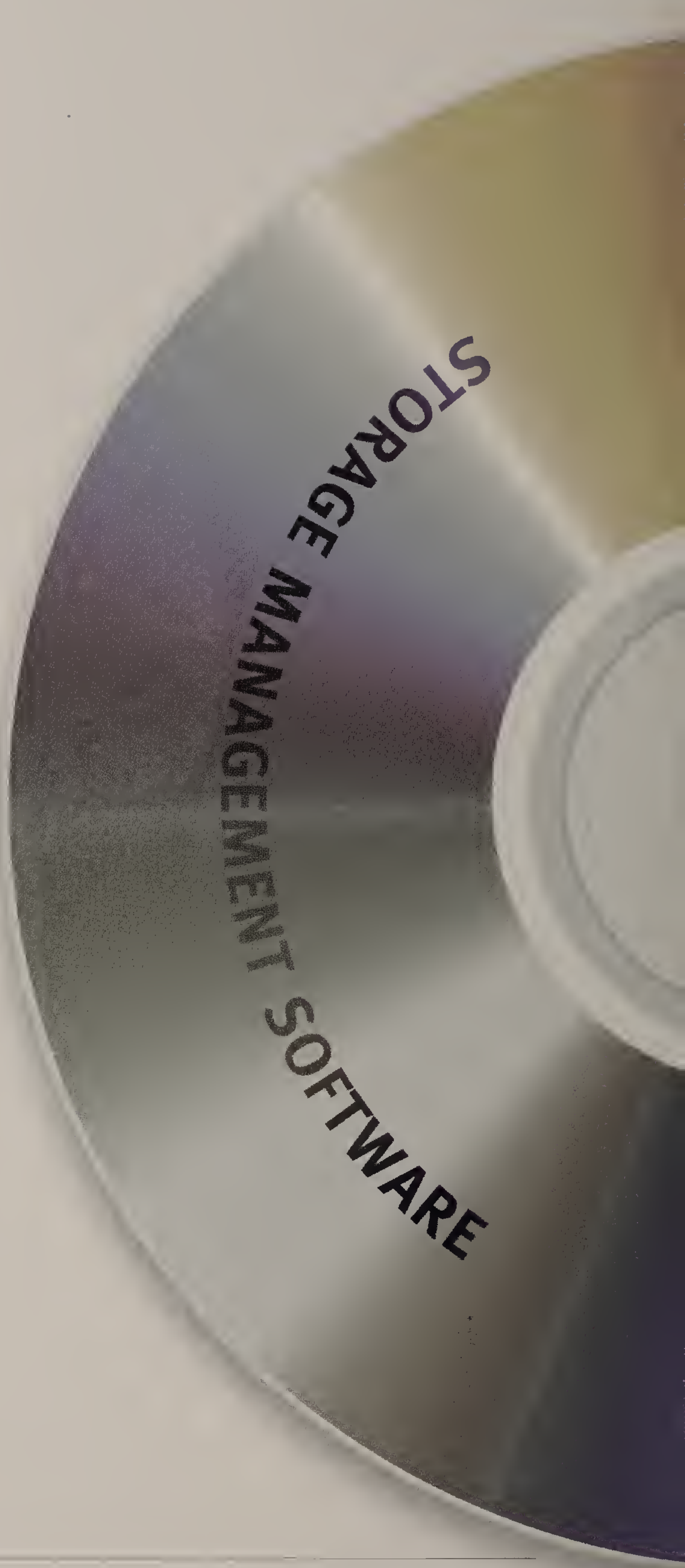

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